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B. BURGESS, Captain,
*Secretary.*

Whitehall Yard,
*October*, 1890

## ERRATA IN No. 152.

### Gold Medal Essay.

1. At bottom of page 402 for "120 millions" read "1,200 millions."

2. Page 403, Statistics for 1801. For "25 millions" read "65 millions."

3. On same page, Statistics for 1859. For "32 millions sterling" read "320 millions sterling."

The Journal
OF THE
Royal United Service Institution.

VOL. XXXIV. 1890. No. 154.

Wednesday, June 11, 1890.

SIR THOMAS CRAWFORD, K.C.B., M.D., Q.H.S., late Director-General Medical Department, in the Chair.

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## THE TRANSPORT OF THE SICK AND WOUNDED IN THE TIME OF WAR.

By Surgeon WILLIAM A. MORRIS, Army Medical Staff.

The CHAIRMAN: The subject before us this afternoon is one of extreme importance, and it would be a great pleasure to me to wait to hear the discussion which I hope will follow the lecture; but, unfortunately, I have a very important appointment at four o'clock, and therefore I must vacate the chair. I have, however, the pleasure of saying that Surgeon-General Marston has kindly consented to occupy my place. I hope you will have not only a very interesting lecture, but also a very good discussion, and that public attention will thus be drawn to a subject which cannot be too much ventilated. The care of the sick and wounded on the field and their movement after action is a question which exercises not only the ingenuity but the utmost efforts of all Generals and of all others who have the responsibility of dealing with armies in the field. Public attention is now so much influenced by discussion on the subject of first aid to and transport of sick and wounded, and other points which have been raised by philanthropists, that we in the Army feel that we are hardly doing our duty unless we are absolutely on the spot under all circumstances, to pick up every wounded man the moment he falls, and put him in the best possible position. I need hardly say, as an Officer of some forty years' experience, that that is a thing which never will be realized in practice; and however much we may succeed in organizing the service for the purpose of dealing with this matter, we shall still fall far short of the needs of humanity, and of the expectations of our friends at home, who take an interest in what their soldiers are doing in the field. I mention this rather as a caution than otherwise, lest you should perhaps expect too much from the doctors, and still more from the Generals, which they are not in a position to carry out to the full. I would not venture to make these introductory remarks had it not been that I am obliged to go away, but having said this much, I now beg to introduce Surgeon Morris, the lecturer.

EXPERIENCE from all time has taught nations the necessity of being prepared for war, and never was the inculcation of this lesson more necessary than at present. All Europe is armed to the teeth, and, though Peace is the watchword, it cannot be questioned that the huge forces which from time to time move on their frontier do give rise to uneasy forebodings and misgivings.

Everything seems ready, and it only wants the application of the torch to throw into flame one of the most bloody wars that the world has ever known. The refinement of the present day in the art of destruction, the perseverance in the discovery of still finer implements and materials of war, must suggest to the thoughtful mind many of the terrible results to those engaged which must naturally follow. Machine-guns, magazine rifles, and smokeless powder will not be without their effect; the wounded will be reckoned by their thousands, and the horrors of war will be intense.

Let us hope that England, should she unfortunately be drawn into a European war, will be able to render sufficient skilled medical aid and suitable transport for her wounded, so that while she enjoys the blessings of peace, she may feel assured that nothing will be wanting for the sick and the wounded who fall in her battles in the time of war.

Of all the multifarious duties which fall to the lot of an Army Surgeon, there are none more important than the transport of the wounded. It calls into play all his tact, judgment, and zeal; it requisitions all his resources; it demands expedition; and it is only carried through by unceasing energy and extraordinary exertion. We are insular by nature, and insular by character, and change and alteration of any kind is to the average Briton distasteful; as a consequence all reactions and changes are developed very slowly. In the hour of necessity the nation's eyes are suddenly opened, and all that is required is supplied, and money is recklessly spent to attain that object. Men wounded in the service of their country draw a passionate national sympathy to themselves, and fair hands at home work unceasingly to supply their needs, while brave, generous men go out to the scene of the operations with aid and material, and place themselves under the authorities, in order to supplement the overworked regular staff. There are no obstacles and no difficulties sufficiently great to prevent these philanthropists pursuing the work of the Red Cross, labour for which becomes a passion, and zeal a noble religion.

Ambulance transport includes every class of carriage for sick and wounded men, and it requires to be so adapted that any class of injury may be carried by it, with the minimum of pain to the sufferer, and the remotest chance of increasing the damage he may have sustained. Improper handling and rough carriage are prominent means of increasing pain and damaging wounds.

Ambulance transport, again, differs largely from ordinary transport, a fact which is sometimes lost sight of in treating of this subject. The ambulance men, or bearers, as they are called, must not only be trained to their duty, but require to be kept in continual practice, and it is most necessary that they should have sufficient stamina and strength for their work. The animals used for ambulance transport must be quiet, and trained to carry sick and wounded; and all vehicles or ambulances must be constructed with a view to the work they will have to do, and the weight they will have to carry.

The importance of efficient and sufficient ambulance transport cannot be over-estimated, for if not sufficiently proved on the grounds

of humanity alone, there still remains the knowledge that soldiers fight harder and better when they know that they will be taken care of if wounded. Moreover, the strength of a force may depend on the efficiency of its ambulance transport, especially where the sick and wounded have to be taken along with the force; for a fighting line clogged and hampered with wounded might risk disaster by lessening its mobility, and therefore its fighting value. Lord Strathnairn once wrote: "Transport of the wounded from the field of battle to a good ambulance, besides satisfying the rights of humanity and sustaining that spirit of confidence in the soldier which, like discipline, should never leave him, has another admirable effect: it obviates the incalculable disadvantage of troops engaged in action leaving their ranks for the purpose of carrying off the wounded. Certainly, good soldiers have no other motive in leaving their ranks for this purpose than sympathy for a suffering comrade. . . . . Nothing is so likely to insure a reverse in action as the want of confidence, and the gaps caused by men leaving their ranks to carry away the wounded, which is most practised when it is most prejudicial at the time and places when and where the enemy has caused the most casualties, and consequently every available man should be present and ready to fill up broken lines, and assist, by his concurrence and example in resisting or attacking the enemy."

It will be interesting here to note how soldiers fall, and to observe the manner in which casualties occur in battle. In our recent wars, we have not been pitched opposite an organized rifle fire, but it has been mainly against savages, who, though presenting great difficulties and much courage to withstand, have not resulted in the losses to our side which exposure to volley fire from modern rifles would involve. It may be stated generally, that the idea is to concentrate rapidly a large force on a given point, the weakest that the enemy presents, and literally sweep him there with bullets.

This rapid concentration of force, added to the destructive nature of the implements of modern war, results in large numbers of men being wounded in an almost incredibly short space of time, and within a limited area, or at the point upon which the enemy has concentrated his fire. In the Franco-German War, at the battle of Borny, the French and Germans lost 8,800 men in five hours; at the battles of Mars-la-Tour, Vionville, and Resonville, the Germans lost 17,000 men, the French 16,954 men, a total of 33,954, in nine hours. Surgeon-General Franklyn writes in reference to this battle: "A most fearful battle had come to an end. Everywhere lay heaps of dead and wounded, for this day had demanded as great, perhaps greater, sacrifices than most battles of modern times." It was during this battle that the "Todten-ritt," or death-ride, occurred, when 6 squadrons or 900 men were all killed to 3 troops. At Gravelotte the Germans lost 21,000, the French 12,273, a total of 33,273, in eight hours. At one period of this battle the Germans were exposed to a heavy fire from the French, and are reported to have lost 5,000 men wounded in fifteen minutes.

The total losses in the Franco-German war are as follows as

regards the Germans; the French return cannot be relied upon. Officers 5,342, non-commissioned officers 12,238, men 110,435. The proportion of each arm was as follows:—

| | Per cent. |
|---|---|
| Infantry .. .. .. .. .. | 17·6 |
| Cavalry .. .. .. .. .. | 6·3 |
| Artillery .. .. .. .. .. | 6·5 |
| Engineers .. .. .. .. .. | 2·8 |
| Train .. .. .. .. .. | 0·3 |

88 Surgeons fell on the German side alone during the war.

In the war between North and South in the United States the 15th Indiana Regiment, assaulting Missionary Ridge, and belonging to Sheridan's Division, lost 202 out of 337 in forty-five minutes. At Gettysburg, Pickett lost 2,000 out of 4,900 in thirty-five minutes, carrying out General Lee's order; while "at the assault by Grant on the enemy's lines at Coldharbour in 1864, over 10,000 men were wounded (besides the killed), the greater part in ten minutes, and all in an hour's time" (Swinton's "Army of the Potomac," p. 483). This author further remarks: "Under such circumstances, every resource of the Medical Department is brought into requisition and must be at hand."

These references will be sufficient to show that soldiers fall together in battle, and that large numbers of wounded urgently require medical aid to be provided for them in a limited space of time. They show also how much greater the destructive power of modern arms is compared with those of earlier date. The total losses in four days, in 1815, do not reach by 16,000 men the numbers wounded in seventeen hours in the two battles referred to in the Franco-German War twenty years ago.

Different wars give different results, and it is most difficult to estimate exactly the amount of ambulance transport required for any special campaign. The principal considerations would be included under the following:—

*a*. The nature of the country and its climate.
*b*. The character of the enemy and the nature of his weapons.
*c*. The probable duration of the campaign.

As far as European armies are concerned, Lord Wolseley states (in his "Pocket Book," p. 121): "As a rough calculation you may assume that in a battle between two European armies the total loss will never exceed 10 per cent. on either side, whilst frequently it will be less than half that amount, and if you provide for the care and transport of wounded men at the rate of 6 per cent. of the total force, irrespective of whether they may or may not be exposed to fire, you will have done all that is necessary." It is important to guard against a deficiency of ambulance transport, a contingency which must be considered, but in doing so it must not be forgotten that war is war, and the success of the war is of the first importance to everyone. It is sometimes advanced that wounded men should never be left on the field for any length of time, but this is a doubtful point. A battle rages

all day, and as the sun declines the ambulance is hard at work; it is impossible to carry all the wounded in immediately, and they are better treated near where they fall in small detached groups, under improvised shelter, and carried in the morning. Surgeons must attend these men, and food and rugs must be supplied to them. Under any circumstances the ambulance transport must be efficient, permanent, and suitable, and it will require the most careful administration and thoroughly well organized application to fulfil its duties properly.

Sir Thomas Longmore, in his treatise on ambulances, thus describes the evidences of deficient transport at the battle of Solferino: "At Solferino 300,000 men stood opposed to each other, the line of battle was five leagues in extent, and the fighting continued for more than fifteen hours. The regulated number of ambulance conveyances were in the field on this occasion, but neither they nor the attendants, whose duty it was to pick up and remove the wounded, were in numbers at all adequate to meet the wants of the enormous masses of wounded who lay scattered over that extensive field of action." The fearful suffering from thirst, the want of surgical attention, the numerous deaths which were the direct results of a large proportion of the wounded being unremoved from the places where they fell, until many hours had elapsed after the receipt of their injuries, the evils which resulted from the blocking up of the temporary hospitals near the field, from the absence of means of disencumbering them of part of their patients by transporting them to a more distant hospital, have been fully described by M. Dunant in a work called "Un Souvenir de Solferino," which eventually led to the Convention at Geneva, and the establishment of the Red Cross.

There are times when for military reasons the wounded must be removed, but when the fighting occurs between armies in which the Red Cross is recognized it does not signify. A hasty evacuation of a large number of wounded men to the rear is unsatisfactory for the following reasons:—

1. The Surgeon can only make a short examination of the cases, and apply temporary dressings.
2. All wounded men suffer more or less from shock, and hasty movement intensifies it.
3. The transport would be working in the evening and all night after the battle, on roads they were not accustomed to, and with men and horses tired out.
4. If the evacuation is carried out rapidly, the hospitals would immediately be overcrowded.

The advantages are—

1. All the cases will be thoroughly examined on the field, and placed in the best possible condition for recovery, instead of running the risk of transport to the dressing station, with serious injuries and temporary dressings.
2. All fractures could be permanently dressed and sent through direct to the base.
3. The rest, so necessary for the treatment of shock, will be obtained.
4. The hospitals will not be overcrowded.

5: The wounded will be transferred in order, and with less risk to their lives.

The important point in this argument is that the medical aid must be applied to the wounded where they fall, and as soon as possible, and that transference to the rear with improvised dressings should be limited as much as possible; and this is a matter of no mean importance, that importance being the life of the wounded man.

The arrangement for English ambulance transport is laid very much upon the same lines as those of other European nations. It is divided thus:—

*a*. Regimental aid.

*b*. 1st line of medical assistance. Bearer companies forming collecting and dressing stations.

*c*. 2nd line. Field hospitals.

*d*. 3rd line. Hospitals on the lines of communication to the general hospital at the base, communicating with hospital ships and England.

Considerations of ambulance transport, therefore, cover a very large area, practically from the fighting line to England, and it will be on efficiency of this transport that will depend, not only the front being less hampered by non-effectives, but also expense being avoided, and last, but not least, many lives saved.

*Regimental Aid.*—This is provided for by attaching one surgeon, one orderly, and a sufficiency of bandages, appliances, and drugs, carried on a mule, with each battalion, battery, &c. For the purpose of carrying wounded, two men per company are specially trained, and before an engagement they fall back to act under the orders of the medical Officer during the action. I have observed these men for some time, and have arrived at the conclusion that they are not the most desirable men for ambulance purposes, where a strong powerful physique is required; they consist, for the most part, of long service men with an inclination to varicosity of the veins or to corpulency; some are lazy, and some, being particular, only fire off the left shoulder. In our mimic battles at Aldershot, and during Easter manœuvres, these regimental stretcher-bearers may be seen aimlessly wandering about the fighting line, apparently seeking for the wounded who may be labelled to "fall out," heedless altogether of the sweeping fire opposite to them, and oblivious of the fact that if lead were flying about not one of them could live. The importance of these regimental bearers during an action is very questionable; personally I do not think they are of any use, and would rather see them lying down with their comrades in the fighting line. But the question will then arise, how do you propose to provide for the immediate requirements of the fighting line? The answer will be, that during peace time every Officer, non-commissioned officer, and man should be instructed regularly in the application of aid to himself, and in all the common methods of arresting hæmorrhage personally; for instance, a man receives a severe cut on the hand; if he knows that by lying on his back, covering the wound up tightly, and clutching the spoke of a wheel or the branch of a tree, and at the same

time placing his free fingers on the artery of the arm, that he will be perfectly safe till medical assistance arrives, so much the better, and there is no better instruction for this purpose than that contained in the syllabus of lectures on "First Aid to Injured," and given under the auspices of the St. John's Ambulance Association in civil life. The value of this instruction is enormous, and many lives are saved by it yearly. Of course there will be cases of men who cannot treat themselves, and the surgeon (I think there should be two with every battalion and one to every battery, instead of one to three batteries) must reach them and attend to them. This suggestion is made on account of the nature of the present "attack." When a battalion goes into action, it is at once divided into right and left half battalions, and these again into their respective companies. One surgeon cannot attend the whole under these circumstances, and half the battalion must be without medical assistance. With the Royal Artillery the case is even worse, for the three batteries to which a surgeon is posted may be miles apart. Further, it is of the utmost importance for a medical Officer to know and to be known by those whose lives are entrusted to his care, for the hand of an able surgeon laid on a wounded Officer or man he knows allays fear, and gives a confidence that may go far in accelerating the recovery of the patient. It will be a great boon to medical Officers to be attached to regiments for the first five years of their service, and it will certainly be productive of that mutual confidence so necessary between the physician and his patient.

After the fighting has ceased, large fatigues might be arranged to assist in bringing in the wounded, and to this end the whole battalion of any regiment should be instructed in the elements of the work of bearers.

After a lull or a cessation of the firing, the 1st line of medical assistance, in the form of the bearer company, comes into action. During the attack it has been in cover, and within easy distance. The company extend and advance to the front, each section under the charge of a surgeon, and each detachment under a non-commissioned officer, to attend and carry the wounded back. All should be fresh for the work, which now begins, and continuous work for a day to a day and a half may require to be accomplished before there will be any more rest. The work of a medical Officer, and of all medical establishments, transport or otherwise, is of the severest nature at this juncture, and the strain is enormous. The wounded will be systematically searched for, and conveyed, after the application of the first aid by the surgeon, to the collecting station by the bearers. This will be done on stretchers, by hand seats, and various forms of improvised carriage. The collecting station will be a short distance to the rear, under cover, and, if possible, on a road. It will be indicated by a Red Cross flag, and here, under the direction of a staff sergeant, will be ambulances and pack transport. Stretcher carriage, when properly carried out, is the most comfortable and safest form of carriage there is, but the bearers must be trained to keep in mind the necessity of avoiding all jolting, of preserving the broken step, and of prevent-

ing all pain to the wounded by unnecessary movement. Transport Officers and surgeons should remember that the duties of a bearer are extremely hard and irksome; there is no military duty requiring more strength, and the standard of 5 feet 3 inches for the Medical Staff Corps is too low to obtain the right build of man for this work. A wounded man on a stretcher weighs about 190 lbs., and this load has to be carried by two men in a constrained manner, that is, with a broken, short step, the weight being carried in the hands and assisted by a strap passing over the back of the neck on to the handles of the stretcher; then the rear bearer carries proportionally about three-fifths of the load, and the front bearer two-fifths. Let anyone take up two 16-lb. dumb-bells and hold them in the attitude of a bearer marching with a stretcher, and advance a short distance, and he will obtain an idea of the nature of the ambulance bearer's work. Instead of 5 feet 3 inches, the limit should be 5 feet 6 inches, and the Medical Staff Corps supplied entirely by "transfers" from other regiments, thus obtaining the right class of men, and rendering this carriage efficient. A man 5 feet 3 inches in height is extremely small, especially if he has only a 33-inch chest measurement. One day's hard stretcher work with men of this stamp would inevitably result in a large non-effectiveness from sickness.

At the collecting station the wounded will be coming in from all directions, some walking and assisting each other, and some being carried in by detachments of the bearer company. The wounded having been loaded on the transport at the collecting station, under the superintendence of a sergeant-major and a staff sergeant, will be at once transferred to the dressing station.

These wounded men may be practically divided into four classes:—

1. *Mortally wounded.*
2. *Dangerously wounded.* } Will require comfortable lying-down accommodation.
3. *Severely wounded* .... Will probably all require lying-down accommodation.
4. *Slightly wounded* .... Any form of transport is suitable.

It must not be forgotten that, in addition to their injuries, all will be fatigued and exhausted, most of them will be suffering from pain and shock, and all will be depressed by their misfortune in being wounded, and by the necessary reaction after the excitement of the battle. On an average one man in every five will be placed in the first and second category, and two in five in the others. The loading of these cases on the wagons will not be quite as easy a matter in practice as it appears. It must be remembered, that after the surgeons of the Bearer Company have attended to the wounded on the field, no more medical Officers will be available until the dressing station is reached. With serious cases coming in, and being transferred to the wagons, all kinds of complications will of necessity arise; a slight jolt, or a careless movement may start hæmorrhage afresh, or convert a simple fracture into a compound one, and there will be no one present to attend to these but the non-commissioned officers in charge.

I am of opinion—and I think most surgeons will agree with me—that no injury or wound of any severity should be handled by anyone but a surgeon; and my object in stating this is to lessen the suffering of the patient, and the risk of his losing his life on his way to the dressing station, and last, though not least, for those reasons which are embraced under the expression anti-septicism or Listerism, or that form of surgery which only a prudent medical Officer, in the light of present knowledge, would adopt. Therefore I conclude, a surgeon should be present at the collecting station.

The forms of carriage for ambulance transport at the collecting station will be:—

A. Pack-animal ambulance transport.

B. Wheeled ambulance transport.

The animals utilized for ambulance transport are: elephants, camels, mules, and ponies. The first two are used principally in Indian ambulance transport, and time will prevent any further reference to them. Mule ambulance transport, which is chiefly used, will embrace all the principal points connected with this class of carriage, and to this I shall devote myself.

Mules for ambulance transport require to fulfil many conditions before they can be considered efficient means of sick carriage. They must be large and strong, quiet and docile, and accustomed to the carriage of wounded men in cacolets and litters. I have seen mules fail under the weight of two men by reason of their not being able to sustain it; and I have seen also—fortunately only when practising—mules throw their loads; it is hardly necessary to say that with really wounded men this must on no account happen. The unsatisfactory character of our mule ambulance is due to one glaring fault, and that is the animal when carrying sick is very much overloaded. Colonel Furse, in his work on Military Transport, on page 74, writes: "For horses and mules the weight to be carried is generally laid down at 200 lbs. (pack-saddle included)." On page 211 he further writes: "The strength of few mules is equal to the heavy weight they would have to carry, for we find the weight of the pack-saddle, bridle, litter, and palliasse is given at 167 lbs., and, even if reduced to 100 lbs., the weight of the equipment with that of two men, taken at 10 stone each, would amount to 380 lbs.; and this is a severe load for a mule at any time." This distinguished Officer's note is of the greatest value. I had some experience with mules and ponies at one time during my tour of duty in India in connection with Colonel Mosley's crates; and I here refer to some notes made then, merely substituting the word "cacolets" for "crates." My note runs thus: "The ordinary load for a transport mule is 160 lbs., *i.e.*, for an animal 14 to 14½ hands—

| | |
|---|---|
| 1 pair of cacolets at 56 lbs. ..... | 56 lbs. |
| 1 pack-saddle and bridle (complete) .... | 62 „ |
| 2 British soldiers at 160 lbs. each (they keep their rifles)..... | 320 „ |
| | 438 lbs." |

This load is absurd, almost for the very largest class of mules; I may add if they are carrying litters the load is increased by 50 lbs., bringing the total to 488 lbs; and, if the equipment be wet, 20 per cent. extra weight all round may be fully allowed.

This form of ambulance transport, therefore, can only be used for short journeys, and not as a continual service; and, even then, the only class of animal suitable for the purpose is of the gun-mule type. These animals are valuable, difficult to obtain, and are required for other purposes. In countries where the mule is common and is used regularly in the daily avocations of life, as in Southern Europe, the conditions are somewhat different. There they are used all their lives for riding purposes. Mules are of no value for ambulance work if their load exceeds by very much 200 lbs. for the largest type of animal; with a view to making them more efficient for this purpose I devised a special saddle of a most simple nature. It consisted of a plain pad with a footboard on each side, with holes in it, into which the toes could be pushed. Two patients rode astride, and, to steady them in the saddle, were two loops arranged, after the manner of the Australian bucking strap, to which they could hold by their free hands; each mule was led by an attendant. By this means I was able to reduce the load 78 lbs., and it was placed in a more favourable position for carriage, thereby enabling an ordinary mule to carry the weight of two men.

Mules have been much lauded for their usefulness in mountain warfare; this form of war is uncommon, and I am quite certain English mule carriage in its present state would fail. It is not an efficient or reliable form of ambulance transport, and for these reasons:—

1st. That the weight required to be carried is too great for the animal.

2nd. That selected mules are the only animals that will answer the purpose.

3rd. That selected mules are expensive and rare, and would be of more value to other branches of an army than the medical.

4th. That it is impossible to load them with less than four men.

5th. That these men must be trained.

6th. That the cases carried by mules could far more easily, and with less risk to the patient, be carried in any ordinary country cart.

7th. That the attendant and the mule require extra transport for themselves, and both require feeding.

Horses may be used for ambulance purposes, and the same arguments that were used for mules apply equally to them. Ponies are also useful, but can only carry one man. Neither are, however, usually available for ambulance transport purposes, or, when used, it would generally be by mounted troops.

Sir Thomas Longmore, in his treatise on ambulances, describes very vividly "the rapidity and sure manner with which the Arabs manage to carry off their wounded from a field of battle, on the backs of mules or horses, without any regular mechanical convey-

ances, and with the aid only of the common pack-saddle sacks and cords, which are used in carrying stores." The plan is briefly as follows: "The mule being ready saddled, two large sacks are stuffed full of straw, leaves, or grass; one of these sacks is then firmly corded on each side of the pack-saddle, and this done in such a manner that the convexities of the two sacks and the upper surface of the pack-saddle are all in the same horizontal plane. Any depressions between the saddle and the bags are made level by stuffing in hay or grass. This forms the litter. All that remains is to throw over all a cloak so as to make the support soft and even for the patient, who is then placed upon it in a recumbent posture, across the animal, and not parallel to his line of walk. The litter formed in this way has quite length enough, from side to side, to carry the patient crosswise. Afterwards, as opportunity occurs, branches are arched over it, so as to protect the patient, in case of need, from sun or rain." Dr. Bertherand states that Europeans, as well as natives, who have travelled long distances in this fashion, declare this mode of transport is very easy, and almost entirely free from jolts. If it be a wounded man who is thus carried, and he is suffering from such a severe injury as to be unable to help himself, he can be securely tied to the litter, and can be taken at a gallop without risk or excess of pain.

I would, with deference, recommend this mode of carriage to the mounted branches of the Service as well worthy of trial. The application of ambulance transport to cavalry is a most difficult matter, and many ideas have been formulated, but none completely surmount it. Small bodies of horsemen may be scouting, and one of their number is wounded by the enemy. What is the result? If he cannot ride he must be left to the mercy of the enemy. Under more favourable circumstances, and under the blessings of the Red Cross, the case is different, all that is necessary is, for his comrades to give him some food and water, and an extra blanket, and make him comfortable up for the time. They must, however, note his whereabouts, and report.

In the American War, two-mule litters were used, one mule being harnessed in front and the other behind. Colonel Furse, in his work before alluded to, writes: "This style of sick transport entails a great waste of power, as two animals and several attendants are required for each patient, but independently of this, it is also open to grave objections. If one animal move more rapidly than the other, damage to the litter or harness will ensue; the litter cuts off sight of the ground from the hindmost animal, and renders him particularly liable to stumble; if one of the animals stumbles, either the other one will come down or the conveyance be broken. If the two animals keep step, the litter vibrates to such an extent as almost to throw the patient out; if, on the other hand, they break the step, a compound joggling motion ensues very discomforting to the patient. The length of the animals and litter are serious drawbacks in tracks where sharp curves and turnings are frequent."

There is also a form of one-horse litter used in America, called the

"travois." It is a kind of sleigh litter, and consists of two long poles of strong material, and turned up at their thicker ends, these rest on the ground, and on traverses, which hold them together, the patient rides. The thin ends are run into a saddle on the back of the horse. It is said to be suitable to plains and grass, and can be lifted over any obstacles. Colonel Furse remarks on the travois: "For wounds of the trunk and fracture of the thigh this contrivance is less objectionable than when employed for wounds of the head and fracture below the knee, in which cases the jarring and bumping on the ground cannot but cause distress." I draw special attention to this extract, because it happens to comprise all the most serious cases that an Army Surgeon would be called upon to transport; viz., injuries of the head and trunk, fractures of the thigh and leg. I should not approve of carrying any injuries of this sort in any improvised ambulance if I could avoid it. Fracture of the thigh, and this must never be lost sight of, is an accident which is dangerous to life itself; with careless handling it may produce great deformity, and the best results are, not infrequently, accompanied by lameness; all these risks are intensified by movement. Injuries of the head and trunk may be slight or serious; fractures are always serious, especially with regard to the long bones, because in curing these, in addition to saving the life, it is necessary to restore the limb, so that its owner may resume his work without let or hindrance from bad union of the fractured ends or even non-union. It cannot be too widely known that absolute immobility is the order for all fractures, and though that cannot always be attained, a condition as near as possible must be obtained. I have drawn attention to this paragraph because an indistinct understanding of it by amateurs might be productive of the most serious consequences.

B. *Wheeled Ambulance Transport.*—Wheeled ambulance transport is that form of carriage by which sick and wounded men are transferred from place to place in conveyances pushed by hand or drawn by animals; the former include wheeled litters and stretchers, the latter ambulances. In addition to these, and by no means the least important, is the improvised wheeled transport or the adaptation of the carts of the country or locality, by simple means, to the requirements of sick and wounded men. Wheeled litters have formed a class of ambulance transport for a very long time, and their history is very well described in Sir T. Longmore's treatise on ambulances; the most valuable work on this subject extant. The principal forms in present use are the Neuss, the Ashford, and military wheeled stretchers.

*The "Neuss" Litter.*—Weight, complete litter, 1 cwt. 2 qrs. 14 lbs.; truck, separately, 3 qrs. 7 lbs. This litter is the invention of Messrs. Neuss of Berlin, and was first employed by the Prussian Knights of St. John, and considerable attention has been paid to its design to secure an easy and a steady position for a patient, while being transported in it.

*The "Ashford" Litter.*—This litter, which was invented by Mr. John Furley, consists of a folding stretcher with a pillow and removable

cover, resting without any fastening on four small iron crutches, with an under carriage of two wheels on elliptical springs. It is a light, strong, and economical litter, carrying a stretcher that can be shortened by pushing in the handles, and narrowed by breaking the traverses. The four iron legs which support the complete litter when resting fold up under the handles in a most convenient manner. The axle is cranked to allow the rear bearer to pass between the wheels, and this is a great convenience. The weight is as follows: —Litter complete, 1 cwt.

There is a sealed pattern of a military wheeled stretcher, but it is used very seldom in the Army.

In 1885, at the Camp of Exercise, at Delhi, I was directed to make some experiments with McDermott's wheeled carrier, an arrangement by which this gentleman desired to carry a Lushai dandy on wheels. I mention these, because they show the doubtful value of this class of carriage, off the roads. The carrier weighed, with the dandy, 240 lbs., and was pulled by a rope by one bearer, assisted by a second, who guided the pole. On the good roads in India they answered admirably, but it was different off the roads, and crossing the country. I took six of these carriers a 10-mile march across country—by no means excessively difficult, and which a bamboo-cart would cross easily. The result was that two turned over and three were broken, and instead of requiring two men, they required six each, and then the work was heavy.

On good roads this class of carriage is valuable, insomuch that it economizes bearers, reducing them 50 per cent., for where four men must attend a patient on a stretcher, two, or even one, would amply suffice. These litters are of doubtful utility off the road, and especially in fine light soil, they sink into the ground, and the draught is excessively heavy. It is for this reason that they are not adapted to the front in war; but at the hospitals to the rear, they would be invaluable, especially if the wheels could be used for the transport of light stores, when not required for the sick. The "Ashford" litter has been adapted for the use of the Army, and carries the regulation stretcher, and is in use at several home stations. It economizes labour, and should be used far more than it is. Every hospital and every main guard should be supplied with these litters, and they are peculiarly well adapted to Indian cantonments.

Wheeled carriages of all kinds require roads to work upon, and the efficiency, or otherwise, bears a direct proportion to their excellence. In a country where there are no roads, or only those of the rudest and most primitive description, wheeled carriages of any official pattern are practically useless, for if the empty ambulance does not become too heavy for the animals attached to it, the conveyance of the wounded would be almost out of the question, on account of the excessive jolting and movement to which they would be subjected.

On the Continent, the ambulances used for the transport of the sick and wounded are very elaborate in design and construction, and there is an inclination, at times, to compare the English ambulance transport unfavourably with them. I have examined most of these

carriages, and I do not think the comparison fair. It must be remembered that Continental nations have some advantages in these matters which we have not; for instance, their carriages have not to be taken to pieces for stowage on board ship, and again fixed up in the hurry of debarkation before being used; they further know the gauges and nature of all the European roads in their own and neighbouring countries; but we fight our battles, now in one hemisphere, and then in another, and often, as in Upper Burma, in lands where no roads adapted for any class of vehicles, except the country cart, exist. Continental ambulance transport would never be suitable for all the variations and vicissitudes of English campaigning. There is, however, one lesson that we may learn from our neighbours, and that is, that their transport is made for and adapted to the wounded; but in England, in that respect, we are not quite so advanced. General service wagons are not adapted to the serious injuries of modern war.

In the English Army, horses and mules generally draw the ambulance, while in countries where bullocks are the draught animals, they are used. The class of animal for ambulance work should be strong and hardy, quiet and docile. Speed or action are not required, but a slow, measured pace, of 3 or 4 miles an hour, is quite fast enough for the purpose, and should not, as a rule, be exceeded. Led or driven horses are infinitely preferable to the postillion fashion of the Army. An interesting circumstance, which a French anatomist proved some years ago, was that a horse was a more perfect machine walking than trotting, and could accomplish more work through a longer space of time, and with less expenditure of energy, than at any other pace, from the fact that the levers of his body are more perfect and co-ordinated at that pace than at any other. This is, moreover, borne out by every-day observation, and proves the truth of the adage, "It is the pace that kills;" and it is hardly necessary to say here, that we desire our transport to last. Proportionately, one horse will do more work than two, and two more than four. In the English Army all transport is arranged for pairs; one-horse carriage is uncommon; three-horse very rare; the loads, moreover, are very unequal; for instance, a loaded ambulance on Mark IV weighs over 30 cwt.; a water-cart under 20 cwt.; there is a limit of pace and a limit of endurance in every animal, and a slight excess over either, particularly if continued many days in succession, will weaken, if it does not destroy, the efficiency of the transport.

Before describing any particular forms of ambulance carriage I will endeavour to lay down some general principles upon which an ambulance should be constructed:—

1. That as the vehicle will have to carry sick and wounded men, it should be constructed so as to minimize, to the smallest extent possible, the risks of adding pain to the sufferers, or, indeed, of aggravating their injuries.

2. That the springs be made with special regard to the weight they will have to carry.

3. That there be accommodation for four, and never less than three

patients, lying down, and three sitting up, and one attendant with comforts and appliances carried on the wagon.

4. That the floor of the wagon be not more than 3 feet above the level of the ground. Any height above 3 feet is inconvenient for loading purposes.

5. That the wagon loaded be drawn by two horses, the total weight not to exceed 1 ton, including 10 or 11 cwt. for the vehicle.

Ambulances, on these lines, are very much better for their purpose than those at present in use, for the following reasons :—

1. With the wheels taken off, they could be easily placed on a ship and stowed.

2. In battle they can be kept under cover more easily.

3. They are light and very portable.

4. They carry just as much as the largest vehicle in the Service, with a less expenditure of horse-flesh, and at a less cost to the country.

I now beg to draw your attention to the model of a wagon and tent, made to scale, which represents the "Tortoise" combined wagon and tent. Although the few wagons which have been built to show the equipment are of a wider track than the regulation pattern, it is found that the latter track of 5 feet 2 inches is sufficiently wide to permit of receiving all the stores for a hospital tent, together with stretcher, bedsteads, blankets, medicine chests, in fact every requisite, including three days' provisions for twenty patients, this having all the advantages of an ambulance wagon when not required to be used as a field hospital.

The tent, which weighs 368 lbs. when pitched, is 30 feet by 20 feet, and is made in four pieces, so that it can, when removed, be transferred to two pack animals, or can be arranged for carriage by men. It can be pitched with or without the wagon as a support. It has tube ventilators, which regulate the admission of air when the tent is closed. It is made double, with a ventilated space, between the canvas and the lining, which encourages circulation of the air in the tent without draught. The side lines are attached to the tent. The walls are made in sections, and laced at the joint, so that the whole wall or any portion can be rolled or hitched up, or propped up like a verandah. It is fitted with windows adjustable when required to give light sufficient for operations, as well as to give cheerfulness to the interior. The tent is carried on hoops, forming a cover to the wagon. The two sides of the tent are folded and placed in the raves of the wagon, and the ends are rolled so as to rest on the front and after hoops of the wagon. The whole may be pitched ready for the reception of the sick and wounded in fifteen minutes, and struck in the same time.

These tents have the following advantages, viz. :—their shape makes them capable of resisting the pressure of the wind. Owing to their low pitch of roof and colour, they are less visible to the enemy; and at night lights inside the tent are invisible to persons outside. The tent being spread round the wagon, stores from the wagon are unloaded under cover. When striking camp, stores are

also under cover, ready for loading into the wagon. The hospital wagon when packed, including three days' provisions, eighteen stretcher bedsteads, cooking apparatus for fifty men, and allowing 200 lbs. for patients' accoutrements, is about 4,600 lbs. weight, say for four horses, rather over 10 cwt. per horse. The wagon stove can be used on the line of march, thus enabling the attendants to provide beef tea, soup, and hot water at all hours, the fact of these comforts being always available, even when on the move, will often be found the means of alleviating suffering and saving life. The stove can be used inside the tent, or in hot weather the cooking may be carried on outside, as it is easily removed from the wagon.

A lighter wagon has been devised by this Officer, weighing 11½ cwt., *fitted* with stove, water-tank, reserves of medicine and bandages, and two stretchers for patients in a recumbent position, the upper one raised on Mr. John Furley's patent stretcher elevator; and fitted with a "Tortoise" tent, measuring 20 feet by 18 feet. A light field railway forms part of this equipment. The wheels and axle frames on which the car or stretcher beds rest weigh about 80 lbs. A mile of rails weighs 8 tons, and it can be very rapidly laid down. There is scope for the further development of this economical form of transport.

I have had many opportunities of working with this wagon, and can testify to its extreme usefulness. The fact that cooking can be done as it goes along, and that the tent can be pitched in the most inclement weather, I consider two very important points in its favour.

*The "Furley" Ambulance Wagon.*—This carriage was invented by Mr. Furley for the St. John's Ambulance Association, to render first aid to the injured in our streets and in civil life; but in the later wagons constructed for this gentleman they are able to take the field, and to be used for any military purpose.

The framework is of English ash with mahogany panels, a pine roof and floor, seats of kowrie wood, and wheels of oak, ash, and beech. It accommodates three patients lying down, and one sitting, with the attendant, there is also room for slight cases by the driver. The third lying-down case is placed in position in a very simple and effective manner, by an elevator (patented). This elevator consists of two pieces of iron, bent at a double right angle, and fitting by their free ends into "slots" in the floor of the wagon, one piece is towards the fore carriage, and the other to the rear, both are connected by two lengths of phlanged iron upon which the stretcher rests.

When required for use, the elevator is drawn down on to the floor, and projected slightly out of the wagon, the stretcher is then placed upon it, and the whole elevated by one man into position, and fixed by a screw. This elevation is much assisted by a strong spring fixed in the floor, which would also break the shock of the elevator falling suddenly when being lowered. This, however, in an unlikely contingency.

The Furley ambulance carriage will take the regulation stretcher, and can carry the same number of wounded soldiers with their kits and

rifles, as it does patients in civil life. One horse is sufficient to draw it over good roads, and two would be ample for rough ground. The weight is 11½ cwt. This wagon possesses one excellent feature, and that is, that the whole of the interior can be cleared out, making the carriage available for beds, bedding, or any other light stores.

The ambulances used in the English Services are usually general service wagons converted to ambulance purposes:—

1. *Ambulance Cart.*—This is a two-wheeled cart, very strongly built, and weighing 10 cwt.; drawn by two horses, the driver being mounted. A canvas is stretched on hoops over the wagon to protect those inside. It accommodates four sitting up, or two lying down. This is a very heavy cart, and over-horsed for the work it has to do, and it accommodates too few patients.

2. *Mark III Ambulance Wagon.*—This wagon has four wheels, two of large size (56 inches in diameter) behind, and a smaller pair (36 inches in diameter) in front, locking under the carriage, and thus enabling it to turn round in a very small space. The wooden sides are 20 inches high, and from them, run up from wooden sockets, three iron standards on either side, supporting an angular framework of ash hinged along the centre, forming the wagon roof, which with the sides is covered by white canvas, dropping as curtains over the wagon, and forming also a hood to protect the driver and patients in front, and curtains to shield those sitting behind. A canvas curtain also closes the front of the wagon behind the driver's seat, preventing wind and rain entering the wagon from that end. The interior of the wagon is divided longitudinally by a partition 14 inches high, which separates the floor into two equal portions, and these portions are occupied by two stretchers of the ordinary "Faris" pattern, which are run in on their wheels into the wagon. Besides these lying-down arrangements for two patients, three individuals, viz., the driver and two patients, can sit on the front driving seat; and three more, two patients and an orderly, can sit on a hind seat on a level with the floor of the carriage with their legs hanging out, and protected by a tailboard and leather apron. A sliding partition of wood is placed across the wagon near the rear, acting as a backboard for those sitting on the hind seat. Both seats have leather-covered cushions. Water is carried in a tank (9 gallons) under the body of the wagon, and there is also a corn locker at the rear of the floor of the wagon. A ladder for use of the patients entering the vehicle is carried along the sides of the wagon. There are two lockers, one on either side of the sides of the wagon in front, one being used for restoratives and the other for tools, &c. A double-screw brake, worked by a cranked lever handle, acts on the hind wheels; a drag-shoe is also carried. The rifles and kits of the sick are placed on the floor of the wagon. The wagon weighs about 17¾ cwt., empty, and with eight persons and their kits, 30 cwt.

For shipment the vehicle takes completely to pieces, the iron supports and the roof come off, and the wooden sides are likewise collapsible. The wheels are taken off and the tailboard, and the whole can be packed into a ship-space of about 3½ tons. The wagon

is usually drawn by two horses, and can either be driven by pole or shafts from the seat, in single or double harness, or by a postillion riding one of the horses.

The existing new pattern wagon, which we have just briefly described, also differs from the old pattern wagon by not having a special "wagon-stretcher." The wagon-stretcher was a special article to which the wounded were transferred from the field-stretcher, and then run into the wagon. Surgeon-Major Faris having adapted wheels to the field-stretcher, it is alone used, and runs in along the wagon-floor without the patient being shifted in any way. Spare field-stretchers to the number of four are carried in each sick-transport wagon, rolled up, and suspended by straps from the iron standards on either side.

The latest new pattern ambulance is a large roomy wagon, laid on the lines of an artillery store-wagon, and covered in by canvas. The height of the wagon to the top of the canvas over the fore carriage is 10 feet 6 inches, the floor is 3 feet 6 inches off the ground. It runs on four wheels and does not underlock, and when loaded is drawn by four horses. There is a seat over the fore carriage for three patients slightly wounded, while inside two patients can be carried on regulation stretchers, and there are two seats in the wagon at the foot of each stretcher for two more sitting-up cases. A water-tank is carried under the wagon, and there is a place for a few medical stores. This wagon empty weighs 19 cwt., and when loaded about 33 cwt.

This wagon is too large and unwieldy ever to become a satisfactory ambulance, and it would in action be difficult to keep it under cover. The wheels not being underlocked is a great fault, as the length of the wagon necessitates under these circumstances a large space in which to turn round. The floor of the wagon is too high, and with two horses it is under-horsed, with four, over-horsed.

Country carts possess a great many advantages to recommend them for the purposes of ambulance transport. By the country cart is meant the common vehicle in daily use for transport, and employed by the inhabitants of any country. These carts are indigenous to the soil on which they work, they fit the ruts of the tracks, and their build and springs are exactly adapted to the ups and downs of the roads of the country. I know of no forms of improvised wheeled ambulance more comfortable and more suitable as a rule than the hired carts of the district. Observation and practical experience through time has instinctively taught nations the most convenient forms for their locality, and their carts are no exception to the law.

These carts differ widely from one another, but all lend themselves in a remarkable manner to the carriage of sick and wounded men, when properly improvised. The structure of these carts is light, being principally of bamboo lashed with rope, while the wheels are solid wood. Their transport value is very great, inasmuch as they can be drawn from any village, and the driver is usually the owner of the cart and bullocks, therefore it is to his interest to make his unit of transport last as long as possible. What does he do? He feeds his animals well, and understands their ailments; he harnesses

and loads well, so that the point of limit of endurance of the animals may not be exceeded. He knows the roads, and is able from materials always at hand to repair his cart when it breaks down, and by no means the least important point in these carts is, that they can be hired and discharged as required. The Indian hackerry and the Burmese cart are examples of this class. In Europe, omnibuses, private carriages, and light carts are available in abundance, and contrivances for rapidly improvising them would be quickly at hand, so that any detailed reference to them is scarcely necessary. It is to some carts, models of which are here shown, that I should like to draw your attention.

The simplest form of improvised country cart is to fill the bed with straw, and lay the patient prone upon it.

A cart with two bamboos meeting at a point before and behind, to the arch of which is slung a stretcher, is a capital form of carriage; the stretcher may be further steadied by filling the cart with straw up to it. In India bamboos are placed upright in the corners, and a bedstead slung by the legs from these is a common and most comfortable form of carriage.

The French have a plan by which they fix the handles of the stretcher by spring hooks to each corner. I have never seen this used, but it strikes me as unpractical.

There are many other methods which would rapidly suggest themselves to a man of resource, which need not be further mentioned here.

Two-wheeled hired carts are more satisfactory for ambulance purposes than four-wheeled, the latter are not so "handy," and cannot adapt themselves so well to the unevenness of the ground, but for slight cases or stores they cannot be surpassed.

All ambulance wagons of the British Service could be converted into general service wagons, which indeed they are, at the least possible cost. The economy effected by such a conversion would be considerable.

In conclusion, therefore, the various points I have endeavoured to make may be summed up as follows:—

1st. That regimental bearers during action are of questionable value, and that in lieu of them, the men should be fully instructed in times of peace, in methods of applying relief to themselves.

2nd. That there are too few medical Officers in the British Service for the safe conduct of a campaign from a medical point of view.

3rd. That it is better, except under the conditions indicated, for ambulance and medical establishments to advance on to the field and distribute themselves among the wounded, than to attempt to pass them rapidly to the rear, the only results of which would be the overcrowding of the hospitals, and the sending back of many who would recover in a short time (two or three hours), or those dangerously wounded, to whom movement increases the risk.

4th. That pack-animal sick transport, as it now exists, is useless.

5th. That the English wagons are too strong and heavy for the carriage of sick and wounded men, and that strength sufficient for

ambulance purposes in the field and equivalent efficiency could be obtained with smaller and lighter wagons.

Owing to the scope of my subject, I have not been able to enter very fully into any details, and have only attempted broad principles; and I may say here that I have not been actuated by the desire to decry any of the forms of ambulance at present in use, though I do not altogether approve of them. I have written this paper from those points which should ever be foremost in the mind of a military surgeon, and they are the means of relieving the pain and allaying the distress of those wounded in our battles, and lastly, with the hope of provoking a discussion of a subject of no less importance than that of saving life itself.

Surgeon-General MARSTON (Chairman): We are all much indebted to Surgeon Morris for a very painstaking, thoughtful, and practical lecture, and I think perhaps the best way in which we can manifest our sense of obligation to him would be by having a lively discussion. Seeing a number of Officers and gentlemen who are well able to discuss these subjects, I am very glad to invite them to do so.

Lieutenant-General R. M. LOWRY, C.B.: As an old soldier I may not claim to be anything of an expert on the present state of ambulance work, but I cannot refrain from saying how glad I am so important a subject has been brought—and so well brought—before us this afternoon. I am satisfied, from the small experience of years long past, that it is a subject on which we then greatly lacked skill and adeptness, and in the treatment of which our practice was sadly defective. And I am also satisfied that if we are to be well prepared for the exigencies of future wars, we must now in time of peace make better study of it, and preparation for it. I do not hesitate to say that the treatment of the sick and wounded on active service is only second in importance to the matter of better preparedness for attack and defence, and to our keeping pace with the very rapid advance of late years on all sides in the art of war in general. Yes, I am of opinion that with such advance must be corresponding progress in our mode of tending and treating wounded men on the battlefield, and for their removal from it. I remember how we were hampered at the Alma by men falling to the rear to attend to their wounded comrades. It has probably been the experience of others also that when it comes to any serious crisis in war, and troops are in or advancing to the attack, that there are some men over ready to fall out in too great numbers for such purpose, and I consider that some suitable training and pre-arrangement for such duty should always—as far as possible—be made. This somewhat promiscuous falling out is perhaps more especially the case if, as with some brigades at the Alma, men have been previously halted for a time under fire. I remember, too, how towards the close of the campaign in the Crimea, the deadly struggle in storming the Redan was somewhat weakened by no regular preparation having been made for getting the disabled promptly removed to the trenches in the rear. We will probably never be able to make anything like complete preparation for all emergencies, but I think some telling off, and some previous training for such occasions, is very desirable. And, therefore, I feel that everything that can be done in time of peace, to be better prepared—by a larger supply of medical Officers, of trained bearers, improved wagons, and appliances on the spot—for war emergencies, should be done. I am glad to see so many expeperienced medical Officers, civil and military, here this afternoon. The expression of their opinions on the important matter of the transport of the sick and wounded cannot fail to be valuable, and I trust it may be thoroughly and well discussed by them, and by the public press. I am glad, too, to see near me on this occasion my friend Surgeon-Major Platt, of the Volunteer Medical Staff Corps, who has so long taken so able and active a part in organizing and establishing admirable ambulance facilities for a district of this great metropolis, and who, I trust, will take the part in this discussion his experience so well qualifies him to do. The more perfect we make our much needed ambulance system in time of peace, the more readily we

can develop and expand it in those times when the need becomes so urgent. In concluding my few remarks in opening this discussion, I can only add, Sir, how thankful I feel to Surgeon Morris for coming forward as he has done, and so ably treating so important a subject.

Deputy Surgeon-General Don: Mr. Chairman, ladies, and gentlemen, the ground covered by my friend Surgeon Morris is so extensive, that it is entirely impossible to go over it in general criticism; and, therefore, I will only offer you observations on certain points. There can be no question of the exceeding importance and exceeding interest of this subject, and I may also say exceeding difficulty. It is surely exceedingly important that we should give our voluntary soldiers to understand that when stricken on the field of battle they will at least have the best and the speediest attention which medical science can give them; but the difficulty in carrying that out is enormous. I am afraid that the great advances which have been made in the direction of perfecting engines of destruction in the shape of machine-guns, magazine rifles, and such like, have to a certain extent obscured and left behind the other necessity, which we must face, of providing for the alleviation of the wounds and the suffering which these weapons are certain to inflict. The destruction which these weapons will cause has already, and I fear must necessarily far outstrip any efforts to meet the case entirely; and therefore I agree with what Sir Thomas Crawford said, when he opened this meeting, that too much must not be expected from the medical department and from medical Officers on the field of battle. Where, as in the case of Gravelotte, five thousand men are stricken down in fifteen minutes, it is beyond all power that we can bring to bear in the shape of ambulance companies, that all these men shall receive that speedy attention which is absolutely necessary if life is to be saved. There are one or two points which Surgeon Morris did not touch upon, which I think are of importance. The word "ambulance" to us in this country is synonymous more or less with transport; but it is not so on the Continent. In Continental armies "ambulance" is employed to mean succour to the wounded, whether in the shape of transport or of medical assistance; so that it means considerably more than with us. Then, there are two great lines of transport in every army, the front and the second line. The front line is that which moves with the fighting force, and enables it to advance or retreat, as the case may be. The second is that on the line of communication which brings up food, warlike stores, and everything required at the front, and takes down the wounded and disabled, and all that requires to be removed from the front. But for medical purposes we have divided our front line of transport into two; our first line includes the regimental stretcher bearers and the ambulances which reach back to what is called the dressing stations; at that point we come in contact with our second line of transport, belonging to the field hospitals which are supposed to be placed sufficiently far in the rear to be out of the zone of fire. I think it is somewhat unfortunate—although it may be of advantage in our organization—that we have thus departed from what other nations understand by the "first line." They carry their first line beyond the dressing stations back to the field hospitals, which are practically part of their ambulance system, and which, as I have said, means more than mere carriage. It is, therefore, an important point whether our field hospitals in our second line would be covered by the Geneva Convention, because the Convention only extends to a certain distance. As far as I am aware, hospital equipment by itself is not under the Geneva Convention, and so if our Army was forced back, and the lines of communication seized by the enemy, they would be perfectly warranted and justified in holding our hospital equipment as not under the Geneva Cross. I should like to have information on this subject, as it seems a moot point how far our field hospitals and other transport would come under the Geneva Convention. I quite agree with what he says about mule transport carriage. I think, from what we have seen and know, that animal pack carriage on the field is often a nuisance and generally impracticable. I have never seen any method by which either mule, horse, camel, or elephant transport could, without risk, carry wounded men. I think a great deal more might be done with wheeled transport. We have lately been working a good deal in that direction, especially my friend Mr. John Furley, Captain Tomkins, and other gentlemen; and I think much more might be accomplished with the two-wheeled carriage; the weight

of our four-wheeled wagons is such that they sink into the earth, they should have broader tires. I think the days of the doolie in India are numbered. When one thinks of the number of doolie wallahs required in an Indian campaign, it would at all events be impossible to take them into the zone of fire under repeating rifles such as we have at present. The only practical means we have of removing men from the field under fire, in my opinion, is by their fellow men, either in arms or by stretchers. I consider it impossible to take ambulance animals into the zone of fire under existing conditions. Therefore it appears to me that even the collecting and dressing stations are too near the zone of fire for the efficient working of animal ambulance, because if a beast is shot, everything is thrown out of gear. I fully agree with my friend when he says that our medical personnel is not sufficient in the front; and at the same time would emphatically say that anything of the nature of a scratch medical service in the front must be utterly suicidal. You do not require to be a military expert to see that it would be most dangerous to go into action without a sufficient number of trained and disciplined Officers and men in the front to succour the wounded. You have, as General Lowry says, during an action men falling out in every direction to assist the wounded; that is a danger which has always been felt. You see a sound man sitting down beside a wounded man, and ask, "What are you doing there?" He answers, "There is nobody to look after my friend; I will stick to my comrade." That is a kindly feeling, and sure to happen, unless we have a sufficiently and thoroughly equipped regular body of bearers at the front. It must not be any scratch or hastily got together body, but composed of trained, enlisted, disciplined men. Let all the assistance we can possibly receive from Aid and other Red Cross Societies be given to us in the rear of the front line, but let us have a thoroughly trained service for our first line, and thereby most effectually guard against that falling out of men which is such a serious matter for the fighting ranks.

Surgeon-Major W. JOHNSTON, M.D.: I notice two or three things that I might remark on. Mr. Morris speaks of the necessity of continually training the ambulance men and keeping them in practice. I fully agree in the necessity of training both Officers and men during the time of peace. The medical department is the only branch of the Army which is not so trained, and it is only by taking advantage of field columns and manœuvres that we can expect to obtain an efficient medical service. When a column goes out from Aldershot or elsewhere, it should have with it its medical personnel and matériel, as laid down for war; there should be a field hospital and bearer company with each brigade and the requisite staff. But what is the case? A column left Aldershot a few days ago, and is now fighting battles in the neighbourhood with the following personnel and equipment: one surgeon-major, one surgeon, one sergeant, four privates, four ambulance wagons (not for the purposes of training or instruction, but to bring any men who are ill from the field into Aldershot), one cart, and one water-cart. Moreover, the four ambulance wagons were taken from the very scanty equipment that there is at the training school for instruction purposes, and the instruction at the school was consequently crippled and hindered for some time. There is no transport available, no Officers and no men, although I am quite sure the General Officer Commanding would have been only too pleased if he could have had his medical department properly organized. I say, therefore, it is useless to expect medical Officers in time of war to be acquainted with the mechanism of a machine which they have never seen before, and, besides, there is no other way, except experiment during peace, of finding out where that machine wants improving. It is rather hard, therefore, to condemn and ruin the reputation of medical Officers for their failure to conduct a field hospital when they never saw a field hospital, and never saw the Officers or men belonging to that field hospital till they were in an enemy's country. I quite agree with the author in what he says about the moral effect of soldiers knowing that they have help at hand. I agree with him also that regimental stretcher bearers are of very little use. It stands to reason that Commanding Officers will not give the most suitable men, and I think it would be much more to the purpose to have the bearer companies enlarged. In my opinion it was a retrograde step when, in 1883, the size of a bearer company was cut in half. I differed from my old chief, Sir Thomas Crawford, in the view taken at that time on this matter, and I think the sooner we go back to

having a real instead of a toy bearer company the better. What Mr. Morris says about sending out large fatigues to assist in bringing in the wounded is hardly practicable. This might be done the next day, but certainly on the day of battle the men are too fatigued, and their nerve power is so exhausted that I do not think you would ever get them to go out and fetch in their wounded comrades. Then he refers to the size of the Medical Staff Corps men. I think it is an unfortunate circumstance that the standard of size has been reduced; the consequence is that the men we get for the Medical Staff Corps are not men who want to go into it because they have a liking for the work, but because the recruiting sergeant tells them they are too small for the other branches of Service! I do not quite agree that we should have all the men transfers from other corps. I think it is a good thing to have a certain number of transfers, but I would by no means have them all. He also says that if medical Officers were attached for five years to regiments they would "know the men and be known." I think this would be what ladies call "very nice," but I do not think it is practicable. Men, say in the Guards, are three years with the colours, and nine years in the Reserve, and if there were war at any time the ranks would be filled up to a great extent by Reserve men, who could not possibly know their doctors. The lecturer is also right, I think, about the mules being too small. Mule transport has been decried very much in this lecture. I have had no experience of it myself, but I am told in Egypt it was fairly successful. He also speaks about hospital ships. I think it is a very desirable thing that we should have hospital ships ready equipped, and not made up with scratch appliances. The Chairman knows how the "Victor Emanuel" was fitted out as a hospital ship, and then afterwards pulled to pieces. I think it would be very much better to keep such a ship in constant use, so that we should not have complaints like those that were made the other day about an Indian troopship overcrowded with invalids, as it might be employed during the winter months in bringing home sick men from India. Medical Officers and men would thus also become acquainted with the routine duties of a hospital ship. In conclusion, I would congratulate the author on the possession of a zeal which has induced him to write this lecture, and I hope the conditions of his service will be such that he will not lose this zeal, and that his efforts to improve the organization of the medical department in war may be more successful than they have been in the hands of those who have previously attempted this task.

Mr. Reginald Harrison: There are one or two points in this interesting paper to which I should like to refer. I think I ought to apologize for addressing you from a civilian's point of view, but I may say that some years ago I was very much impressed by seeing the condition in which patients were brought for treatment to the various hospitals in this country and elsewhere. I took the opportunity of going out to America and seeing there the whole system of ambulance, and I use the word in its broadest sense, more particularly in reference to casualties and accidents, such as form the basis of the cases at our civil hospitals. I gave a large amount of time to the subject, and I am glad to say that within the last few years in England considerable attention has been given to it by the medical and surgical press, and by gentlemen such as Mr. John Furley, who I think has succeeded in impressing the British public with its importance. It is not for me to discuss matters about which I know very little, that is to say, matters relating to surgical practice in time of war, but it seems to me that, apart from the humanitarian point of view, if we are to do much good by our ambulance system it ought to come into operation as soon as possible after the wound or the injury is inflicted. It is often in the first one or two hours, or the short time that elapses from the time of the injury until the patient comes into the Surgeon's hands, that the large amount of damage is done; and that it is especially noteworthy in the present day, when we attach so much importance to the views and practices which are associated with the name of Sir Joseph Lister. It, therefore, seems most necessary, as urged by the previous speaker, that provision should be made for the treatment of the wounded in the field at the earliest possible moment. I will not take up your time by any further observations of my own, as I see so many Army medical Officers who I am sure are more competent to speak, as far as the paper under consideration is concerned, than I am. However, I thought I should like to take the opportunity of

expressing my very great admiration of the paper which has been presented to us to-day.

Surgeon Commandant NORTON: I think we must congratulate Surgeon Morris on the paper which he has brought before us this afternoon, and I think it will serve an excellent purpose in bringing the matter before the higher authorities, so that a great deal may in future result from it. As Mr. Harrison said, there is no doubt it is our great point that we should bring our hospitals to our wounded as well as our wounded to our hospitals. If we can get our hospitals well up to the front, whether tents, huts, or barns, or whatever they may be, it must be a very material advantage to the wounded, and very beneficial to the wounds from which they are suffering. On the other hand, after a great battle, it has been the habit to send the wounded back to the villages in the neighbourhood. What is the result of that? An order comes, perhaps on the following day, for strategical reasons, that these villages are to be evacuated; certain lines of regiments are coming forward, and every wounded man in the village has to go. Again and again we have prayed to be allowed to have wounded men left, to whom removal meant death, but no, the order was, "Go, they must," and go they did. Surgeon Morris mentions about the number of wounded there was in the War of 1870. I suppose the 130,000 Germans he mentions means the number of deaths, rather than the wounded, that is to say, dying from disease. I do not think the Germans had anything like that number of killed and wounded, judging from the earlier and most severe battles. It is, however, quite clear, when we consider the number of wounded brought in in so very short a space of time—as mentioned at St. Privat, some 6,000 men shot down in six minutes whilst advancing up the hill—that we cannot possibly deal with them at once, no matter how many Surgeons we have. How can you supply a sufficient number of Surgeons for the first twenty-four hours? But still it does behove the Government to reduce the suffering as much as possible, and to bring as many Surgeons as they possibly can into the field in that twenty-four hours, having due regard to the fact that if there is a sufficiency of Surgeons in the first twenty-four hours, of course they must be vastly in excess in later times. Then there is a point that I think ought to be noted. Why should not every soldier be thoroughly taught the elementary surgery contained in the St. John's ambulance lectures? Those lectures are becoming very general. I know myself of very many lives in civilian life which have been saved in consequence of a very simple knowledge of some surgical point, and I think it might just as well be a general rule that every soldier should have some such knowledge. I could mention a number of instances, such as when a person has bled to death by a rupture of a varicose vein, where a single finger upon that vein would have stopped the hæmorrhage, and saved the life; and so a vast number of lives of soldiers on the field of battle could be saved in the same way; of that there is no doubt. Talking of mules and country carts, it certainly does seem absurd that a mule should be made to carry over 500 lbs.; it seems an impossible thing. But then we recollect that the mule only has to go about 1,000 yards with his burden, and therefore he is useful when the nature of the country prevents the employment of carts. We know that in all wars, in the Franco-Prussian war especially, the common carts of the country were largely made use of; they were far more comfortable than our ambulance wagon; a quantity of straw was put in the cart with a light covering over it, and nothing could better it. Then there is another point with regard to the cavalry, there is no arrangement whatever for cavalry ambulance, and what is the result? Supposing there is a brigade of cavalry: there is an order that there shall be a bearer company to attend on that brigade. Imagine a bearer company, an infantry company, starting off with a brigade of cavalry; it is all right when war is carried on under the rules of the Geneva Convention, but a large number of our battles are fought with savages, and in that case should a catastrophe occur to the cavalry, every single man of that bearer company would, of course, be slaughtered; therefore the sooner something is arranged for cavalry the better. It ought to be thought well out, and it must be thought well out; there must be some sort of cavalry ambulance. I will not occupy more time, but I will say, in conclusion, that this paper will, I hope, lead to some further consideration of the subject, the result of which will be that after some years have passed we shall look back upon the treatment of the wounded at the present day as inhuman and cruel,

just as we at the present day look back twenty years at the treatment of the wounded at that time, when, in fact, they were left largely to the mercy of a few bandsmen.

General WHITWORTH PORTER: May I be allowed to speak on one single point, which is that about the training of a soldier in ambulance work? I would point out that over and above the advantage it would be if all soldiers did know something of the matter, we have this in addition, that when they have left the Service they would go back to their different districts and carry with them the knowledge which they have gained whilst they were soldiers. I think, looking at that from a civilian point of view, it is a very great and important addition to the military advantage which would be gained by training all soldiers, Officers and men, in ambulance work.

Lieutenant MACLURE, London Scottish: I should like to endorse what has just been said. For the last thirteen years I have been engaged in the Volunteers, training men to know how to handle the wounded. We have at the present time some five or six thousand men trained in this way in England, and also in India and the Colonies. I hope the Government will assist us in continuing this training. Our present system is to give three months' training, and then the men have to pass an examination, and to pass the examination of the Army Medical Department to qualify them to hold the Army Ambulance certificate. I am very glad to see that we have a number of men trained in that way, and if an emergency should arise, I think that they will be ready to take their part in the front with the Medical Staff Corps.

Colonel F. J. LLOYD, R.A.: I have very few words to say beyond thanking the lecturer for his discourse. I am hardly entitled to speak before an audience containing so many distinguished Officers in the medical profession, but there are one or two points which occurred to me as having seen the ambulance at work in the field. There is also one point on which the lecturer did not touch, to which I should like to refer later on. I think we are all entirely agreed as to the powers of mules for the conveyance of sick and wounded, and that if a mule is to be expected to carry between 400 lbs. and 500 lbs., even for so short a distance as a thousand yards, you will require animals of a superior class to those you have at present. I do not know any breed of mule that can carry 500 lbs. The military load for a mule is generally taken as 200 lbs. in addition to the pack saddle. Camels are exceedingly unsatisfactory. Camel cacolets are the most uncomfortable things to ride in that man ever conceived. I hope if we are obliged to have camel transport in any future war, some better arrangement may be devised, but I doubt if we shall ever get over the difficulty of the pace of the animal, which is a matter we cannot control. We shall probably have to adopt some form of wheeled carriage for transport from the field to the dressing stations and the field hospitals, where no other form of communication exists. The present ambulance wagon is exceedingly heavy and inconvenient, and I can speak from experience that if you are sick or wounded it is an extremely uncomfortable conveyance to ride in unless the roads are very good. I had the pleasure of being transported in one of those wagons about fourteen miles over extremely rough country, and I think I never suffered so much pain in my life. I hope that some means may be taken in future to devise a lighter and better form of ambulance wagon than we have at present. The lecturer did not touch upon the railway ambulance. Those of us who have been at the Military Exhibition have seen the sections of the carriage for conveying sick and wounded in a railway train, and we had transport of that sort up the Nile in 1884–85. The system adopted of converting the third class carriages into ambulance carriages was exceedingly satisfactory. The patients were brought up in stretchers from the river at Assiout and put into the hospital train. We had three or four carriages, I think each capable of carrying sixteen patients, and also a travelling kitchen. The stretchers were suspended with their handles in loops made on cords hung from the roof, and were secured to the floor of the carriage. Probably the greater part of those here are well acquainted with those carriages.[1] There was only one thing to be noticed with

[1] Surgeon-Major Jennings, who was in medical charge at Assiout, contrived and

reference to them which might be improved upon, and that was that they were not quite steady enough, and that the patients were sometimes jolted against the sides of the carriages. On an ill-made railway like that between Assiout and Cairo that is rather a serious matter. The utmost use was made of the available space; the carriages were 32 feet long. I think they each took sixteen sick or wounded men, and having ridden on one of those stretchers, hung up in this way, I can speak to their comfort, except in that particular point. If the cords which carry the stretchers were crossed there would be hardly any lateral motion, and the patients would be spared the pain to which they were subjected by the jolting that I speak of.

Surgeon-Major PLATT: Ladies and gentlemen, although not an Army Surgeon, still, as I take great interest in all that appertains to ambulance work at the seat of war, I must ask your indulgence for a few remarks. War does not consist, I believe, simply in fighting; there are the transport, commissariat, and medical departments, which are equally necessary items. An army has to be fed, it has to be transported, and our wounded have to be looked after. Of all departments, I think I am right in saying there is no one more important in improving the *morale* of troops than an efficient army medical department. An army whose rear is clogged with wounded, an army that cannot advance possibly on account of the wounded behind, is one with which no General would care to have to deal, and the ability to relieve efficiently the wounded must be a great source of strength to any General Officer Comamnding. This has been wonderfully exemplified lately in the service given by an Army Surgeon, Surgeon Parke, to Mr. Stanley, and whilst serving Mr. Stanley in that campaign, large with regard to period, but small with reference to the number of troops engaged, I believe that Mr. Parke's services rendered that army one-fourth stronger in numbers than it would have been had Mr. Stanley not had an intelligent and efficient medical Officer. There are many points in Mr. Morris's paper which I must pass by, not because they are unimportant, but because time presses. I quite agree with him that in the British Service there are far too few medical Officers. You cannot be satisfied because your army is on a peace footing; you must be prepared for war. Again, every soldier should be trained to give to himself, or to supply to others, the means of first aid. That would be a wonderful advantage, and that instruction could well be given of course by the Army Surgeon doing duty at the depôt. Then again, Sir, the bearers are undoubtedly too short; there is no work more fatiguing or tiring than carrying a stretcher, and as a principal means of transport between the fighting line and the connecting station in the first line of medical assistance, the distance must be got over rapidly and efficiently. I think certainly the bearers should be stronger and taller men than they are at present. There is one other point that Mr. Morris mentioned, namely, with regard to leaving the wounded on the ground for some time; I think possibly during the period of shock no harm probably would accrue, but that time would speedily pass by; and then exposure to the weather would be a great element of danger, and the reaction most disastrous! I think the majority of Army Surgeons will agree that the sooner you get your patients under cover and off the ground, the better for their future prospects. With regard to transport, I would make a few remarks. Touching upon the transport from the fighting line to the collecting station, that can only be carried out on stretchers, of the Army pattern, improvised stretchers, or by bearers carrying the wounded men, but beyond the dressing stations we must have wheeled transport in connection with the movable field hospitals; and it is only right that we should ask ourselves as a nation, have we got the best wheeled transport that can be provided? I may be wrong, I do not profess to be an authority upon these matters, but I say without hesitation, although I am open to contradiction or to proof on the other side, that we have not got either sufficient or the best ambulance wagons. The most efficient ambulance wagon at present existing is one the model of which you see on the table. It has had the approval of, and has taken the gold medal offered by the Empress Augusta of Germany, and given by the greatest military nation in the world. Although there were fifty competitors

carried out a simple and very effective improvement in the method of suspending the stretchers.

it was awarded the medal, and was stated to be the most efficient of movable field hospital and ambulance wagons yet devised. I ask, will not the British people at some time or other ask, when lives have been lost, why that wagon has not been adopted? Military authorities of the highest standing have examined it; they have walked round it, looked at it, and said it is the best. Why then have they not exercised their power, and adopted that which is the best for our wounded and suffering? It is named the Tomkin Tortoise Wagon, and was awarded the gold medal, as I said, last year at Berlin. We have another wagon for military purposes, invented by Mr. Furley. It carries more, and is much lighter than the Army wagon. The Tortoise wagon you see there will carry two patients lying down; it has a canvas suspended or looped up round it, and in addition carries provisions for three days. It is for you to say whether you will demand for your soldiers at the hands of your authorities that they shall not have an attenuated medical system, too few Surgeons, and a Medical Staff Corps which is miserably inadequate to the services it is called upon to do in war. You think of your soldiers lying on the battlefield, and you ought to be assured that they will have the most immediate and efficient assistance which can possibly be given to them. It is for the public at home to see, by bringing influence to bear, which they can do, that these matters are not forgotten. They know too little of it, and it is only when disaster happens and war takes place that we are found, as we always are, unprepared. There is no lack of gallantry, there is no lack of enthusiasm, but we are always unprepared. Just one or two other words, and I say them as a civilian, I ask you at home to think of those who are your own loved ones, who fight your battles, and while you would wish to see them well attended to, think also of those, the Army Surgeons and men of the Army Medical Staff Corps, who show equal heroism in looking after their distresses, and to remember this, that heroism is not confined to those who slay, but also exists in those who save, and that sweet mercy, when shown in the presence of great danger, is "Nobility's true badge."

Lieutenant-General Sir JAMES HILLS-JOHNES, V.C., K.C.B., R.A.: The last speaker has touched on many of the points concerning which I was going to make a few remarks, so that I have very little to say. I think what he has put before us is very straight and very good; it supports what Surgeon Morris has very ably brought forward in his lecture. I will, however, allude to one or two of the small headings. I may say that I agree with Surgeon Morris in his desire to have the number of medical Officers attached to regiments and batteries increased. I think he puts the numbers at the very smallest that is necessary on service. I think, as a rule, there always are two medical Officers, if not more, told off to regiments; they may be attached to field hospitals, but I think when they go into action they are always told off to the regiments, at least, if not they ought to be. The battery should always have its medical Officer. As regards the question that it is desirable to have all the men in the regiment trained to the principles of first aid, and to be able to bind up wounds, that is a recommendation that has been supported by every speaker, and no doubt will be supported everywhere. I think Officers in command of regiments would be only too glad to have this subject taken up by medical Officers, and to have the men trained so as to give first aid. It would be a very simple thing to train them; it would not take a long time, and the men would be willing to learn anything that could be of use to them or to their comrades in action. The statement that regimental bearers during action are of little value arises, I suppose, simply from this, that they have not been instructed in times of peace. There is no reason, however, why there should not be a certain amount of men regularly so instructed, and told off for this duty in time of war. They should certainly not be the men who are said to be told off now, either the weak, or the aged and infirm. Strong, powerful men should be selected in time of peace for this duty, and trained for it, and I think it would be a great thing for the regiment that these men should be trained regimentally. Then with regard to question No. 3, with reference to the distribution of the ambulance and medical establishments to advance on to the field and distribute themselves among the wounded, it is better for them to do this, than to attempt to pass them rapidly to the rear. Of course what we have heard from the last speaker must be considered, namely, the danger

of leaving men out in cold and damp weather, and the sooner therefore they can get under cover of course the better for them; but I understood Surgeon Morris to to say, that when they were in the field they would be provided with improvised covering, that there would be a blanket and things sent out for them, which would save them from the danger which is remarked upon. Everyone agrees about pack animals not being good for transport of the wounded, but there are certain instances where you cannot have anything else for this transport, as in the case of mountain warfare, and we have had much to do with mountainous warfare on the frontiers of India. The hills are impracticable for wheeled transport; therefore we must make the best of the animals we have got as a means of carrying the sick and wounded. Objection has been taken to the doolie, or rather it is said that the days of the doolie are numbered. All I can say is, the doolie has been a most useful means of transport, and it is used in India because the European is much too costly a soldier to be employed in carrying his sick and wounded comrades. The native is therefore utilized for that purpose. It is a question of expense, and the European is not sufficient in numbers to be told off for duties which you can get the native to do, and do thoroughly well. These doolie bearers are wonderful men; they will go into the heaviest fire; they never flinch from going to the front, and the service they have done to the Army is simply extraordinary, and deserves the greatest praise. Of course they are paid for it, but still they are not fighting men. I should be very sorry indeed to think that the days of the doolie are numbered, for I think that without the doolie, fighting men can never be properly attended to, that is to say, the care of the wounded can never be thoroughly performed without them. We shall never have Europeans sufficient to do the fighting and the carrying of the sick and wounded also. I beg to thank the lecturer very much for his interesting lecture.

Dr. DANFORD THOMAS: I wish, as a medical Officer of the Volunteer Force, to say a few words with regard to the work which we are doing. We are perfectly willing to devote our time to training a certain number of ambulance men in connection with the various brigades. It is well known to those in the Army, that a very large number of our soldiers are now recruited from the Volunteer Force. They get preliminary training there; they get a liking for becoming soldiers, and they join the Army. In the same way, there is, no doubt, a very large number of ambulance men, who, having been trained amongst the Volunteers, would be ready and willing to augment the Army Medical Staff Corps at a time of war; therefore, I think we should do our best to make the Volunteer ambulance department as efficient as possible. Efficiency has been spoken of to-day as being extremely important for the small number who would be employed in ambulance work, and I would urge, that whilst medical Officers in the Reserve Forces are willing to give their time and attention to training the men, they should have the necessary material supplied to them for so doing. I may say that at the present time the Volunteer medical Officers have to pay for the material and equipment that is required for the stretcher-bearer companies. I do not think that should be the case. I would ask those who have influence in this matter to bear in mind that whilst we have seen special funds raised for the purpose of equipping the citizen soldier, at the same time some assistance should be given for the purpose of providing proper transport, wagons, and materials for the ambulance department of the Volunteer Force.

Sir VINCENT H. KENNETT-BARRINGTON: I need hardly tell you that the subject of this valuable lecture has a very deep interest for me, because I have been out in several campaigns as a Commissioner under the Geneva Convention, and perhaps the most important of my duties was to assist, as far as possible, in the transport of wounded men. Allusion has been made to the effect of magazine rifles and quick-firing guns. The matter was discussed by able authorities at Woolwich at an ambulance meeting, and very different opinions were expressed. I believe myself that the effect will be not necessarily to increase the total number of killed and wounded men in a war, but to increase the proportion of wounded men thrown at short notice on the hands of the Surgeons. Therefore any movement or any discussion which will strengthen the hands of the Government in supplying more efficient ambulance transport and a greater number of Surgeons in the field, is highly

important under the present conditions. In my personal experience of actions where I happened to be near the front, I found that the great mass of those who first required removal had wounds in the hands or arms, and I could see what an advantage it would have been had there been a greater number of cacolets or mule litters at the disposal of the ambulance staff in the early part of the action. In Servia, it was said that a great number of men shot their own fingers off to escape further service, but I am sure that this did not account for the great proportion who were wounded in the hands only. The fact is, that men are generally fighting behind entrenchments or other cover. A man, if wounded in the head or shoulders, would probably be killed on the spot, or unable to move; those who are able to help themselves and first get away are mostly those wounded in the hands or arms. This was recognized in the Carlist War, and a large number of cacolets were used with advantage. It is perfectly certain that in an important war there never were enough Surgeons for hospital or transport. I think one of the best ways of meeting this difficulty is by encouraging leading civilian Surgeons to give their services temporarily. In the Servo-Bulgarian war this policy was carried out by both the Servians and Bulgarians, whose ambulance operations were greatly assisted by the Austrian and German Governments and hospital authorities. We saw at Sofia alone such eminent men as Professor Gluck and Dr. Langenbuck, with staffs of their most trusted young Surgeons, nurses, and trained chloroformists, from the hospitals of which they were the heads at Vienna and Berlin. They took over the worst cases in the special hospitals; other civilian Surgeons assisted in transport and thus enabled a greater number of military Surgeons to serve in the front line. I believe an immense amount of suffering and many lives were thereby saved. With regard to the different classes of ambulance wagons, I concur in the opinion that our War Office pattern is far too heavy. You cannot trust to any given pattern of wagon suiting all campaigns; and I believe that nine-tenths of the wounded men in those European wars in which I have served were transported in country wagons. I have seen myself the very best pattern of Vienna wagon used in Bulgaria, but they were found to be perfectly useless on rough country roads, because the wheels did not fit into the deep ruts, and the wounded men were, in consequence, so knocked about that sometimes they had to be taken out of these wagons and put into country carts. We found the best way of improvising an ambulance wagon out of a country cart was to fill the bottom with fresh twigs cut from the trees, and on these to lay straw, or still better, mattresses requisitioned from the nearest houses. The method of using twigs was, I believe, first suggested by some Swedish surgeon. It certainly is most efficacious in stopping the jar to a wounded man being conveyed over a rough road. Moreover these wagons are generally provided with enormous wheels, which enable them to glide, rather than spring, over obstacles. They go very slowly, which is their main drawback. As to the War Office pattern; we had two of those wagons sent out to Turkey in the Turco-Servian War. They got into the hands of the Egyptian contingent, and were subsequently handed over to me, but I could not use them on the country roads. They were fearfully heavy and required powerful horses, there was but little accommodation, and the wheels did not fit the ruts. At last, I made use of them for taking the wounded men from Varna Railway Station to the hospital in the town, and there on the hard road they were useful. The patterns of wagon used in the Carlist War were excellent. The main arterial roads were exceedingly good, but in the mountains the cross roads were very rough and muddy. We had therefore two distinct classes of wagons, one for the smooth high road and the other for the mountainous cross road. That for the latter was generally a converted country cart carrying but one or two, while that used on the smooth main roads was specially designed so as to carry a large number of wounded. As an example, one wagon which we used for two years (and we only then stopped using it because it fell over a bank into a river) contained twelve wounded men lying down. It was 6 feet broad and about the length of two men lying down. It had two stories; in the hinder compartments of upper and lower story the wounded lay lengthways, with their heads towards the horses, while those in the front compartments were lying cross-ways. By this system any wounded man could be removed or treated without disturbing the others. That wagon, with twelve wounded all lying down, was drawn by five mules only, and

you may imagine that it was of far greater service for use on smooth roads than any wagon of our military pattern. Some allusion has been made to my colleague, Mr. Furley, to whom we all look up as one of the greatest living authorities on ambulances, and one who has had great experience not only in war, but in connection with the St. John's Ambulance Association. I saw our Government ambulance organization, including the bearer companies, at work in the Suakin campaign, and it seemed as near perfection as anything could be. It is true that there was no very great strain on their resources, because the expedition to Berber did not come off; but, with regard to organization, I do not think I have ever seen anything to compare with it. I hope very much those who are in authority will take into consideration what I have said about "cacolets." I know very well that for serious wounds they are not desirable, but for the large number of light wounds in hands and arms, which are so common in fighting behind embankments, I think these cacolets are exceedingly useful. As an example, after the battle of Peña Plata, the last of the Carlist War, I took back to hospital, a distance of 7 miles, eight wounded men on three mules, without a single assistant. The doctors stated that the wounds had not been aggravated by transport on the cacolets. Two of the mules were very powerful, and carried one wounded man on each side and one astride between them, but the third began to lie down when we put the third man on him, and so it only carried two. Gentlemen, I thank you for your kind attention to these improvised remarks.

Surgeon-General MARSTON: The clock warns me that I must say very little indeed. There is one point, however, that must not be omitted. I think we are all extremely thankful for the very able lecture we have heard to-day. It is quite clear from the discussion, and the interest it has evoked, that the lecturer has had a very attentive audience, and we are all very much obliged to him.

Surgeon MORRIS: I beg to thank you for the very kind manner in which you have discussed my paper. I admit the subject is a large one, and I could easily have given you six such lectures without altering my text. As there were so many speakers, I think it will save time if I reply on the four conclusions of my paper. With regard, in the first place, to regimental bearers and their value, or otherwise, in the fighting line. You all appear unanimous that they are not satisfactory, and that the proper and efficient Medical Staff Corps bearer companies should take their place. I quite agree that all bearer companies should be brought up to their original strength. A distinguished Officer, of European fame, told me that he thought the interference with the complete independence that was brought about after Lord Morley's Committee, and the reduction in the numbers of the staff of the bearer companies and field hospitals, were great mistakes that will yet make themselves felt disadvantageously, should we be mixed up in a European war. We ought to have a thoroughly trained and competent Militia reserve, for the Volunteer medical staff cannot be trusted for other than home defence. Personal ambulance was alluded to by me, and I was very glad to see it taken up by nearly every speaker. At present only two men per company are trained, but there is no reason why every man should not be so. Surgeon-Major Johnston referred to the medical establishments with the force at present fighting the Portsmouth garrison. I trust they will not meet the Russians. But this state of things is most disheartening to anyone who thinks as a military Surgeon, and who knows the really terrible risks the force would be actually incurring in real war. Do you suppose that in modern war your tactics are of the slightest value unless you take into consideration your wounded? Surely if it is necessary in our mimic battles to lay field telegraphs, to make bridges, and to perform the various military duties, it is all-important to be assured that we have taken proper steps to relieve our wounded, and, at least, have rehearsed the part the medical service play in the theatre of real war. Every year for a fortnight the medical service of Germany are trained at the headquarters of each Army Corps in the duties that would devolve upon them in war, and nothing is left out to make this instruction as complete as possible. My second contention is that there are too few medical Officers for the safe conduct of a campaign, from a medical point of view. No one has denied this, for it is only too apparent. If war were to come upon us to-morrow the medical arrangements would break down. You cannot trust to civilian

aid when that aid would treble the existing regular staff, and if we leave the country, what then? Where is the Militia Medical Reserve? Much as I respect and honour civil and Volunteer Surgeons, I don't think they would ever be a sufficient substitute for the regular staff, although their aid, as far as it goes at present, in connection with various societies, is of great value. It must be remembered that they have not the experience of the Army that medical Officers have, and I would submit that a military Surgeon's duties are a pure branch of the great profession of medicine, and the more a spirit of that kind is developed and encouraged in the Army, the better it will be for all concerned. It must not be forgotten that if we want more Officers, and of the right sort, the conditions of service should be made more attractive than they are at present. My third point has not been disproved, and where a large number of wounded fall, it would be unwise to attempt to suddenly remove them, but they should be placed under improvised shelter and carried in the morning. This is really what takes place, and has taken place, in the great battles of Europe. Lastly, all of you are agreed that there is room for a considerable improvement in our wheeled ambulance transport, but we cannot expect a sudden change; we can only hope that some day—and I trust it may not be far distant—the actual wants of the wounded in our battles will be met by a sufficiency of medical Officers, by an efficient establishment of bearer companies and field hospitals, and that the Army Medical Service, who can only earn their laurels in the fighting line, and who do not share the glamour of the peace footing, will be recognized as they should be, as most important for the ultimate success of your undertakings.

Friday, June 13, 1890.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

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## THE EMPLOYMENT OF LARGE CAVALRY MASSES, OF SMOKELESS POWDER, AND OF MOVABLE FORTIFICATIONS AS ILLUSTRATED BY THE GERMAN AUTUMN MANŒUVRES OF 1889.

By GEORGE SAUNDERS, Esq. (Correspondent of the "Morning Post," Berlin).

IN September last year I had the privilege of witnessing the manœuvres of the VIIth and Xth German Army Corps in the neighbourhood of Springe, near Hanover. A very special interest attached to these manœuvres, as they formed the first occasion on which the new smokeless powder was employed on a large scale by the German Army. It happened, owing to the journalistic enterprise of the "Morning Post," and to an exceptional conjunction of circumstances, that I was the only correspondent of an English daily newspaper on the field. To this fact, and to the particular interest attaching to these manœuvres, was attributable the considerable attention which, I have since learned, the descriptions that appeared in the "Morning Post" excited at the time, though they were written by a layman in military matters, and by a layman of no great experience as an observer of such affairs.

I should have been the last to aspire to the honour of addressing an assembly like this on topics which form their own special province and which have only transiently occupied my pen as a journalist. But I could not refuse so flattering an honour when offered to me, unexpectedly, by your Secretary. I must, however, ask you to expect nothing more from me than such details as may have been found of interest in my telegrams on the manœuvres. I would ask you, in fact, only to regard me as a scout whom you may have captured in one of the villages about Springe, and from whose narrative your own military talents and experience may perhaps enable you to derive some scientific, or approximately scientific, idea of what took place at these manœuvres. As I understand that in actual warfare such information is not invariably rejected, I shall make no further apology for what I have to say. I should like to add, however, that if in any instance I pass outside the *rôle* of the captured scout, I shall only set up the further claim to act as a species of field telephone, and, unfortunately, not a very good one, and anything of tactical or

scientific value which I may report in this capacity comes from the authorities of our friends—I had almost said our allies—on the other side of the water. In this connection I would at once express my obligation to Major Scheibert, whose book on "Movable Fortifications" is a standard work in Germany, and who, both during and since the manœuvres, has been most kind and courteous in telling me anything which he considered could aid me in my task.

The manœuvres of last autumn began with cavalry operations on an extensive scale. The general idea of the first day's operations was that the Xth Army Corps (then commanded, by the way, by the present Imperial Chancellor, General von Caprivi) represented a Northern Army with its centre at Springe, the Emperor's headquarters. It was supposed to have lost touch with a Southern Army and to be trying to discover their whereabouts. This operation was conducted under the Emperor's personal command. To non-professional spectators, the first two days' manœuvres afforded the most brilliant of all military spectacles—a great display of cavalry; and the interest which they aroused was all the more intense that most German tacticians saw in the events of these two days what they believe will form the introduction to the great battles of the future, namely, a vast deployment of cavalry thrown forwards to reconnoitre and encountering the enemy's cavalry midway between the hostile positions.

The troops which the Emperor, commanding the attacking or Northern Force in person, deployed for the purpose of attack consisted of the whole cavalry division of the Xth Army Corps, a portion of their mounted field artillery (*service à cheval*), and a detachment of pioneers. The Southern Force actively engaged in the defence was made up of similar contributions from the VIIth Army Corps, with the addition of an infantry regiment, whose retreat the vast mass of the cavalry of the Southern Force covered.

About 7.30 on the morning of September 16th, the Emperor learned that his advance-guard had got touch of the enemy near the villages of Altenhagen and Münder, and he commanded his whole force to advance with the greatest speed. When the Emperor's forces (with which I was) approached the villages, they were received by the enemy's artillery, which, acting from a commanding position, succeeded in checking their advance; but the Emperor's artillery immediately returned the fire, and for nearly an hour an exclusively artillery battle raged. Meanwhile, a combined brigade of cuirassiers and uhlans, which the Emperor had sent out to reconnoitre on the right flank, rejoined the main body, and the enemy, observing this addition to our strength, withdrew from their position, strong as it was. And now followed the most remarkable portion of the manœuvres of the 16th September. It is difficult to say which movement was best executed, the orderly retreat of the Southern Army, leaving detachments of cavalry to observe our advance, and so perfectly covering their withdrawal that our artillery could not touch them during the whole operation, or, on the other hand, the masterly way in which our forces were manœuvred. Our artillery, protected by

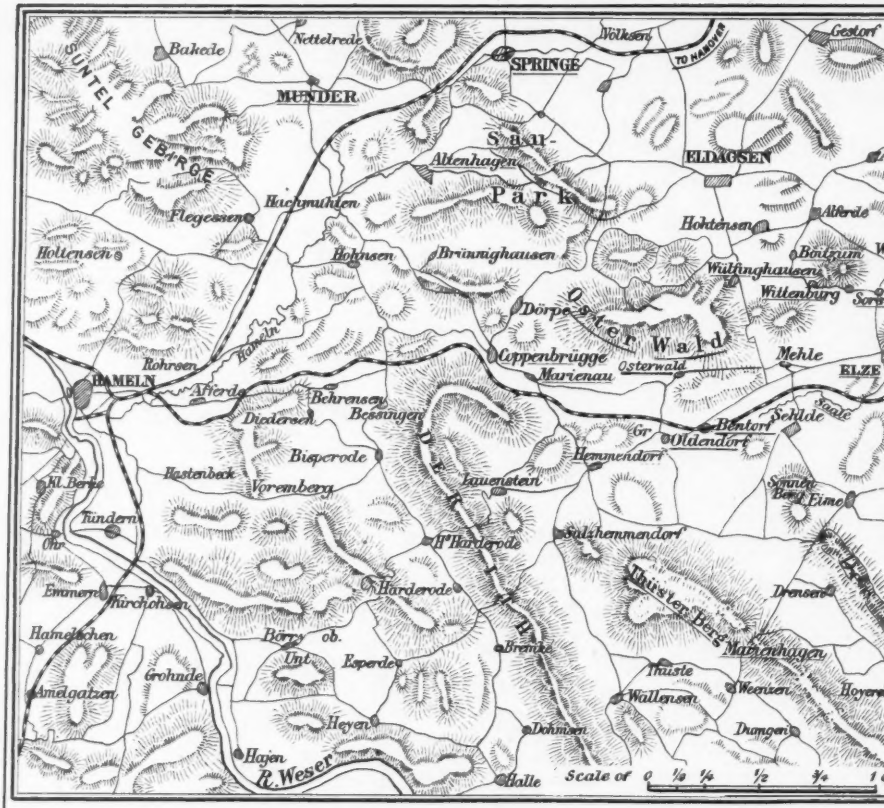
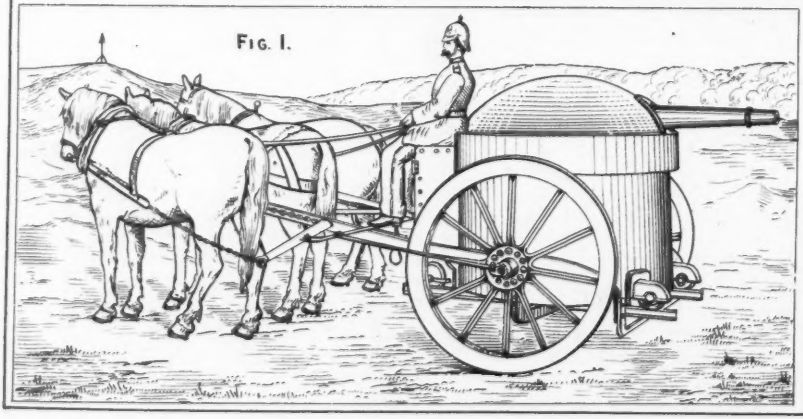



FIG. I.



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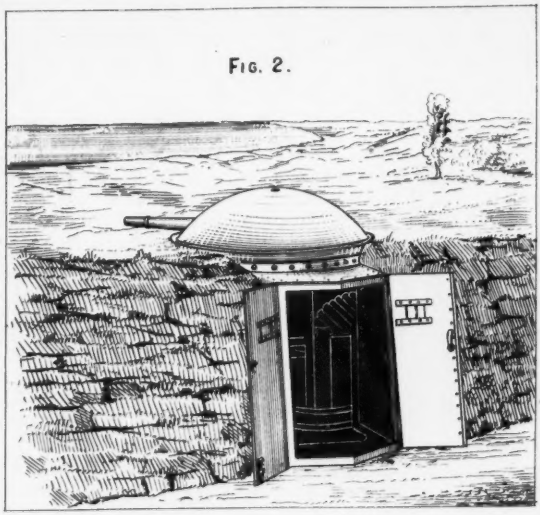

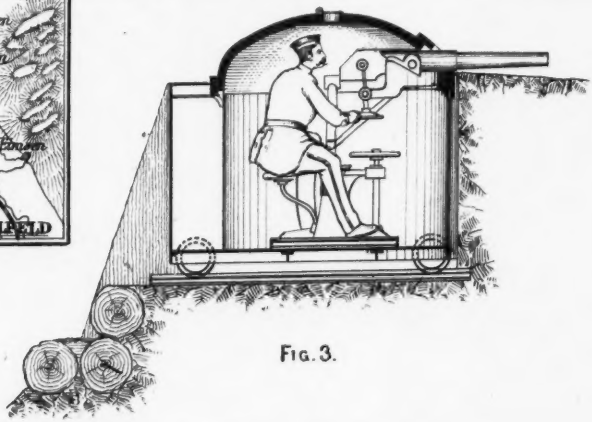

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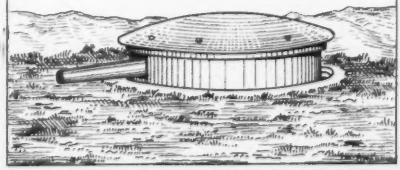
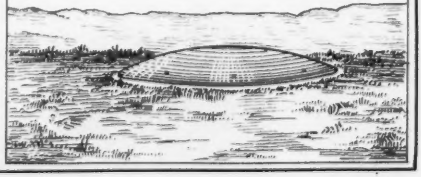


FIG. 5.



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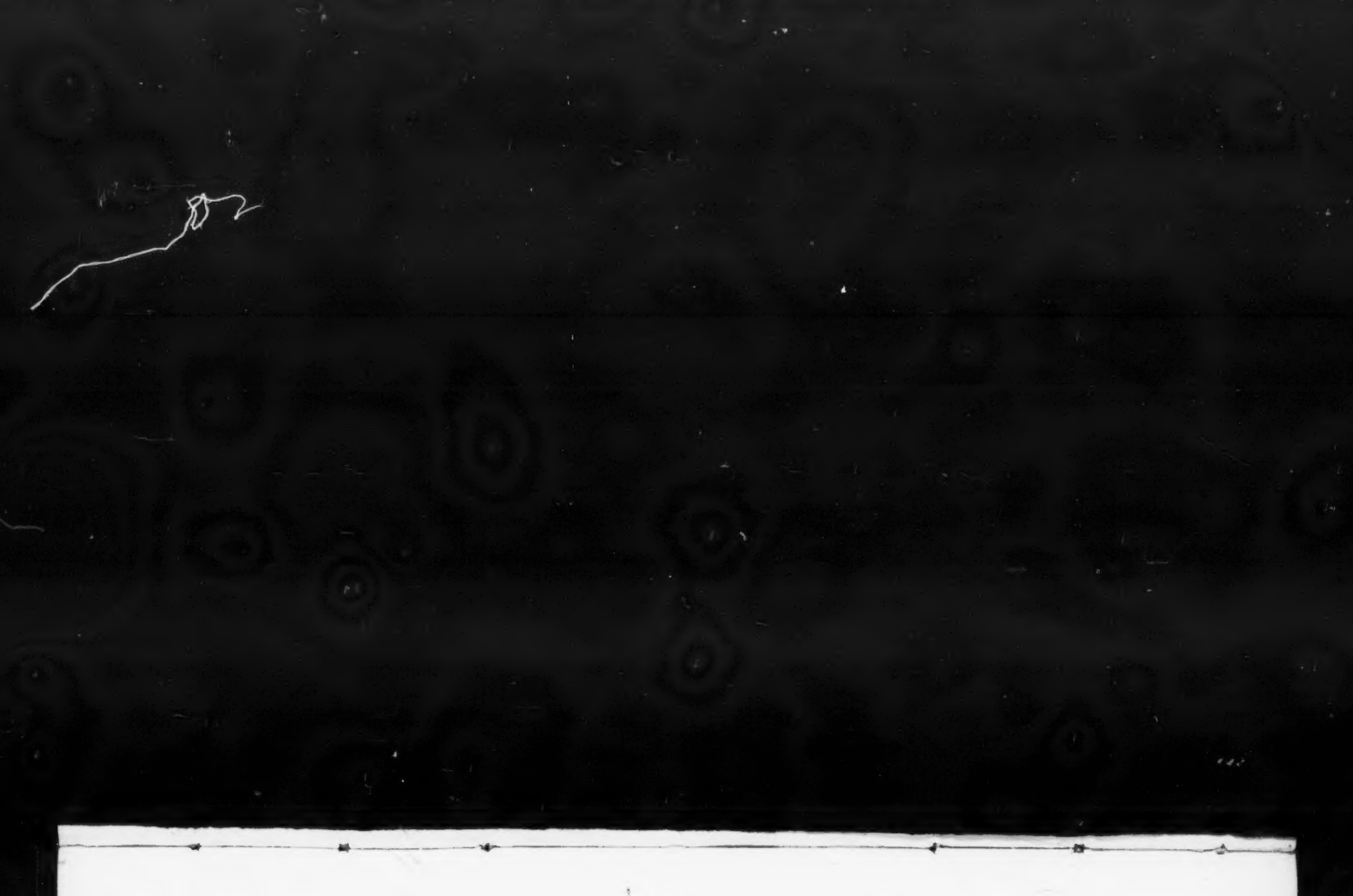

cavalry, was sent forward at a gallop, in order to take the first chance of directing their fire upon the retreat or upon new positions which the enemy might occupy. Indeed, no sooner was the enemy again visible on the heights of Boitzum than our guns came into action, driving them to their final withdrawal on Coppenbrügge. Meanwhile our main force had defiled out of Altenhagen in admirable style, which the difficult nature of the hilly ground, and the trying defiles it contained, rendered all the more praiseworthy. Our task had been accomplished, we were again in touch with the enemy, and had ascertained the line of position he would evidently adopt in case of a general engagement, although no actual encounter, except between artillery, had taken place. The whole day's proceedings formed the liveliest representation of what might with probability be expected to occur during the earliest stages of the next European war.

On the 17th of September, cavalry operations were continued on a grander scale, for the Emperor led the combined cavalry divisions of the VIIth and Xth Army Corps against a skeleton cavalry force retreating eastwards from Coppenbrügge. It was with the greatest difficulty that the spectators could follow the rapid advance of the Emperor's cavalry and the retreat of the skeleton force of the enemy, as the ground which was covered extended for 17 or 20 miles. Never in recent years have cavalry operations been conducted on so magnificent a scale.

The 18th of September was entirely a cavalry action; the burden of the battle fell upon the horse, not as on the previous day upon the artillery. It was a wild pursuit of cavalry by cavalry across an exceedingly difficult country.

The events of these two days were eminently significant as showing the belief of some of the best tacticians in Europe that a new era has dawned for cavalry, owing to the new cautious infantry tactics which forbid the near approach of hostile armies in view of the deadly destructiveness of repeating rifles and the treacherous fire where the smoke of the new powder is scarcely visible. Under these circumstances, the duty will more than ever fall upon the cavalry of skirmishing and reconnoitring, and this skirmishing, which was formerly merely the introduction to a battle, has now become a great battle in itself, involving a new development of cavalry tactics. It has continually happened at the dawn of new epochs in the art of modern war, such as have been inaugurated by inventions and improvements in weapons of precision, that numerous military critics have propounded afresh the theory that the importance of cavalry had become a thing of the past. At the outbreak of the American Civil War this theory was strongly urged, and the cavalry of the South, which subsequently achieved such brilliant results, was created from the most modest beginnings by General Stewart, probably without any adequate anticipation of the great development to which it was destined, and the eminent part which it was to play in the history of the war. With reference to this arm, there is probably no experience so instructive as that of the American Civil War, and there is cer-

tainly none that is more eagerly studied and appreciated in Germany. It is much to be regretted that there is no compendious and exhaustive history of that war which can be consulted by students of military tactics. But the story of Stewart's achievements serves to show what an advantage can be conferred upon forces which may be handicapped in other respects, if they possess a thoroughly disciplined and adequate body of cavalry, capable of acting both on the offensive and as a corps of observation. It has often been said that cavalry forms the eyes and feelers of an army, and cavalry alone can make it possible for those who are responsible for the conduct of military operations, to penetrate the intentions of the enemy and to choose both method and locality of attack, on the ground of adequate knowledge.

But it is eminently true that cavalry not only constitutes the organs of sight for an army, but that it is also the instrument by which the enemy can be rendered blind. A successful attack, on a large scale, by cavalry, breaks to pieces the network of observation which stretches in front of the position of the enemy in the shape of his outposts and patrols. A cavalry manœuvre like that of the 17th and 18th September, at the last German manœuvres, would have resulted in the outposts of the enemy being simply ridden down, and this operation is capable of being conducted with practical safety for the attacking force, which advances no further than is necessary to destroy the enemy's feelers, or to compel him to develop his position. If the first of these tasks be accomplished, the enemy is for the time being practically blinded; if the other be achieved, the veil which shrouds his position is broken through and the greatest advantage is secured in point of superior information in view of a general engagement.

So far as inferences were drawn from the autumn manœuvres of 1889, they all tended to show that the practice of reconnaissance by cavalry in force will in future European warfare obtain much more extended application than in the past. All that can be done by small bodies of cavalry acting against such a network of advance posts as covers the defence of a modern army is to drive in a few outposts and frighten a few sentries. The reconnoitring parties will as often as not return very little the wiser for their expedition, and will have left the enemy without any serious injury to his own means of observation, or to the veil by which he covers his position and plans.

The attack *en masse*, on the other hand, constitutes in itself an operation of serious and, it may be, momentous importance, and it possesses the great advantage of being capable of execution without involving to the attacking party risks at all proportionate to the objects which may be secured in the event of success.

No sooner is a new poison discovered than chemists hasten to devise an antidote; and, similarly, the question arises by what means the attack of a reconnoitring expedition in force is to be counteracted. The answer seems to be unanimous in Germany that cavalry thus employed can best be met by cavalry, when either the enemy's movements will be anticipated by a similar operation on the part of the defending force, or his cavalry will be opposed by an equal body of horse which will frustrate the objects of the advance. This conclusion

formerly received practical application on a large scale on the eastern and western frontiers of Germany, where two independent divisions of cavalry used to be located in addition to the regular complement of the two army corps there quartered. These divisions were intended in case of war to watch and to counteract the similar division of French cavalry lying at Châlons under the command of General de Gallifet, and the masses of Russian cavalry on the eastern frontier. It is true that within the last six months, under the new scheme of German army organization, these cavalry divisions have been disbanded. But the reasons for this course, I am assured, lie in no change of view on the part of the authorities regarding the strategic advantages, or indeed one might say the necessity for the employment of cavalry on such a scale in the event of the outbreak of war, but depend rather upon questions connected with the administration of the army in time of peace and upon one important consideration of a different character, which, I believe, has not hitherto been publicly stated. The authorities, in fact, have the very strong conviction that the command of cavalry more than of any other arm involves gifts which depend upon the character and talents of an Officer more frequently even than upon his experience. I understand that there exists in authoritative quarters a strong desire to keep the hands of the administration free to appoint in time of war to the command of the independent cavalry divisions, which would then be immediately re-incorporated, soldiers who, irrespective of their age or experience, evince a particular talent for this branch of the service. Indeed, it is contemplated that the commands of these divisions shall not, even in time of war, partake of anything in the nature of a permanent tenure, but that it shall be understood to be open to the authorities to appoint for any given operation any Officer in whom they believe that they discern for the time being the most capable candidate for such a command. This policy, however, has not prevented the Emperor from appointing, the other day, to the command of the new Army Corps, which has its headquarters at Metz, the well-known Count Haeseler, who has the reputation of being the best cavalry Officer in the German Army. Before leaving this part of my subject, I may add that there is a manifest connection between the *rôle* which the German cavalry is expected to play in the next war and the policy of arming the whole of them with the lance. For cavalry encountering cavalry the lance will remain the decisive weapon of attack and defence. Great attention has been paid during the past year in Germany to the improvement of the lance itself, and I may mention incidentally that I recently had an opportunity of inspecting the hollow tube of steel, rolled by the Mannesmann process, which has been substituted for the wooden lance shaft. The steel lance is of wonderful lightness, and, of course, of very superior durability.

I must now pass on to the second subject of this paper, the employment of smokeless powder as illustrated by last autumn's German manœuvres. The three concluding days of the manœuvres constituted portions of a single great operation which would in itself be worthy of a special description. But I must confine myself, in

view of the limits of time assigned me, to the specific subjects announced, and I shall only indicate in the most general terms the strategic circumstances under which the trial of the smokeless powder on a large scale was effected.

The general idea which underlay the operations of the 19th, 20th, and 21st September may be stated as follows:—An army, represented by the VIIth Corps, was advancing from the west by way of Paderborn towards the river Weser. An Eastern Army desires to preserve the line of communication between Hanover and Brunswick, and the special idea is that the Xth Corps is defending the railway line between Hanover and Alfeld. Against it is advancing the VIIth Army Corps, with the object of preventing it from concentrating upon the village of Nordstemmen, and thus securing the railway.

The operations of the 19th developed on a great scale, and in a most interesting manner. From the eminence of Sonnenberg, where, during most of the day, the Emperor with Prince Albrecht and the Staff overlooked the battle, and which marked the position of the centre of the Xth Corps, one looked along a broad valley terminating some 7 miles off at Coppenbrügge, the headquarters of the VIIth Corps. The horizon on the left was bounded by the thickly wooded hills of Thüsterberg. On the right the plain was enclosed by the wooded slopes of Osterwald. Before one, as one looked westward along the valley, was stretched the wide plain dotted with the red-roofed villages of Benstorf, Oldendorf, and Hemmendorf, and on the edge of the forest slope on the right lay the village of Osterwald. I should have liked to have repeated the account which I gave at the time, of the interesting advance and repulse of the VIIth Army Corps on the 19th of September. Few things in modern warfare have been more admirable than the brilliant forced march, often as rapid as 8 kilometres per hour, with which the XIVth Infantry Division came up from Hameln to reinforce the XIIIth at Osterwald. This march reflects the greatest honour on General von Albedyll, commanding the VIIth Corps, and on the Officers and men of the XIVth Division. Our infantry (I speak now of the Xth Corps) were strongly entrenched behind the villages in front of the Sonnenberg, and they enjoyed excellent cover afforded by the hedges, ditches, and courses of brooks in and around the villages. Their fusillade and the action of our artillery, which was posted beside the Emperor on the Sonnenberg, were able entirely to check the enemy's advance. But the great event of the day was the persistent attempt of the enemy's cavalry to get in rear of our left flank through the gorge of the Marienhagen. Again and again the attack, which was supported by field artillery, was renewed, and it finally culminated in a magnificent cavalry engagement when the enemy's horse had actually emerged from the gorge, and was met by our cavalry in an encounter so close and excited that several of the opposing horses and riders rolled on the plain. Our charge had broken theirs; they turned tail and made again for Marienhagen gorge, our artillery harassing their retreat.

The result of the day's work was that the position of the Xth Corps remained impregnable, in spite of the extraordinary forced march of the VIIth. We bivouacked on a straight line between the slopes of Osterwald and the Thüsterberg, with the railway safe in our rear, though we were conscious that we should have to fight for it again on the morrow.

I may perhaps be allowed to digress, in order to mention the most interesting novelty of the day. This was the employment of dogs as despatch bearers. It was of immense importance to maintain unbroken and rapid communications between our force which was facing up the valley and that portion of the left wing which remained to watch the Marienhagen defile. Dogs were therefore taken forward with the main body, their masters remaining behind, to whom they returned, swift as arrows, as each was let loose with a despatch bound to his collar. These German despatch dogs are generally spaniels. Their management was intrusted to the chasseurs, who advanced in conveyances with our cavalry (another interesting novelty), supporting them where possible with a deadly fire.

The old smoky powder had been employed by both the attacking and defending force on the 19th September. During the heavy fusillade, and while our batteries were in action, the smoke from our repeating rifles and the artillery was dense, but a strong breeze cleared it away, and made rapid and continuous firing possible. We reflected that on the morrow, using smokeless powder, we should not be dependent on the favour of the wind.

The operations of September 20th, in regard to their results, may be summed up in a sentence. They afforded overwhelming proof that the so-called smokeless powder is a necessity of future warfare.

For practical purposes, the battle of the 20th may be regarded as having taken place along the slope of the Osterwald. Those who are familiar with the valley of the Thames at Oxford will form a good conception of the situation if they imagine the West Corps (the VIIth) advancing, and the East Corps (the Xth) retreating, along the slope which falls towards the village of South and North Hincksey. Down in the centre of the valley through which runs the river Saale raged an exclusively artillery battle. On the further side of the valley the cavalry had intermittent encounters, but the main fight was actually in the forest of Osterwald. On this day I followed the VIIth Corps in its first advance on the position of the Xth. The Emperor was in command of this corps, but he remained during the whole day with the artillery which waged constant battle over our heads with the artillery of the Xth Corps in front.

The advance through the forest slopes was the most exciting episode of mimic warfare I have witnessed. At 6 A.M. heavy rain fell, and a violent wind raged. At 7, when the patrols exchanged shots, heralding the battle, there was still a drizzle, increasing at times to a downpour of rain. Smoke from the red-roofed villages hung low along the valley. It was the very day for testing the merits of the smokeless powder.

The general idea of the operations was briefly to the effect that the right wing of the Xth Army Corps was to be driven back along the forest slope of Osterwald by the XIVth Infantry Division, while the XIIIth Infantry Division attacked the enemy's centre. If the attack succeeded, the right wing of the Xth Corps would have to fall back on the village of Mehle (corresponding to North Hincksey) and upon the village of Elze, still further along the valley of the Saale.

During the whole of the day I accompanied the advance of the XIVth Infantry Division. A little to the west of the village of Osterwald we came upon the enemy as we crept cautiously through the wood, and a rattling magazine fire was at once opened. Our corps (the VIIth) used smokeless powder. The enemy (the Xth Corps) used the old powder, and the results were most striking. The enemy appeared to be unable to determine our distance from them, while the heavy damp atmosphere made the smoke from their rifles lie along the glades of the forest like masses of blue violets. We were continually getting within 200 or 250 yards of them, always enjoying splendid cover, for the ground was so broken that Officers dismounted and had their horses led. Nay, more, we frequently on the edge of the forest took them in the flank, sending forward two or three companies at the double, and the enemy had to withdraw under a murderous fire from their front and left. They seemed utterly unable to guess where the fire came from, and, indeed, would have been next to annihilated before they had discovered our whereabouts.

After two hours' advance, driving the enemy before us in this fashion, we reached the edge of the forest, where it runs up the hill, leaving the plain at an obtuse angle. Here we found ourselves again on an open slope, which fell away before us down towards the village of Mehle, with its red roofs peeping through the lime trees. On the fringe of the wood our men lay down in splendid cover, and, regardless of the artillery fire directed against us from a distance of three miles, they punished the enemy terribly as he withdrew towards Elze, leaving Mehle low down on his right. I seized the opportunity of contrasting smokeless with smoky powder, and hurried forward towards Mehle, to a position immediately between the advancing and retreating infantry.

This was the aspect of the field. Upon the edge of the forest the advancing columns of the infantry of the VIIth Corps, or those lying on the ground, poured volley after volley on the retreating infantry of the Xth Corps. It required keen eyes to distinguish the faint brown puffs of smoke which came from the fire of a whole company. Strangely enough, it occasionally seemed as if one of the old cartridges had got in by mistake among the new ones, revealing its presence by a little trail of blue smoke.

And now, looking towards the retreating infantry of the Xth Corps as they stopped from time to time to return the enemy's fire, from each single rifle came a trail of blue smoke, and from each company as it volleyed, a cloud of dark blue smoke, which only a strong wind dispelled.

Away up, back on the rising ground above Osterwald, are the batteries of the VIIth Army Corps, booming as they shell the distant artillery of the Xth. Here, too, are faint light-brown clouds of smoke, more like dust beaten from carpets than anything else. In the opposite direction, on the high ground above Elze, and on the hillocks in the middle of the Saale valley, is artillery of the Xth Corps, using the old powder. Clouds of blue smoke, like that from burning gorse, shroud their position, and must undoubtedly diminish the rapidity of their fire as well as the accuracy of their aim. In fact, a whole battery of artillery using the new powder does not make half so much smoke as that made by a company of infantry with the old powder; and a whole company of infantry firing a volley with the new powder does not make half so much smoke as a single field-piece makes in firing with the old. Comparing battery with battery, the smoke from the artillery of the Xth Corps is like the smoke from a locomotive coaling up, while the smoke from the artillery of the VIIth Corps is like the faint steam mingled with brown coal-smoke when the locomotive is at full pressure and the furnace is glowing red.

Such was the evidence of the manœuvres of the 20th September. The Xth Corps, so stubborn in maintaining its position on the previous day, was totally at a disadvantage against the VIIth Corps, and had to fall back, with great loss, on Elze, though it had succeeded in maintaining the railway line between Hanover and Alfeld.

I ought not, perhaps, to omit to notice the masterly moves by which General von Caprivi, commanding the Xth Army Corps, though forced to fall back, as has been described, on the Hanover-Alfeld Railway, succeeded in preserving that line, to hold which, up to the noon of the 20th September, was the task allotted to him. Although the infantry of the VIIth Corps, as I have described, pressed forward to the edge of the forest above Mehle, General von Caprivi, by his artillery fire, managed to prevent them from coming further. In the meantime, under cover of his artillery, he made one division of his infantry face the border of the wood, while gradually withdrawing his main body along the uplands, so that had the enemy advanced beyond the shelter of the wood, he would have been taken on the left flank. From the uplands, finally, he concentrated so strongly on Elze that, when "cease firing" sounded at noon, it would have taken two hours' fighting to dislodge him.

The advantages of the employment of smokeless powder, as demonstrated by the manœuvre of the 20th of September, and confirmed by the experience of the following day, may be thus summed up:—

It exercised a most demoralizing and bewildering effect upon the troops exposed to infantry fire.

Further: (I.) The enemy experienced extraordinary difficulty in determining (*a*) the distance, (*b*) the direction, whence the fire came.

(II.) The smokeless powder gave the Army Corps which used it a greatly increased certainty of aim, arising from the absence of smoke from their own fire. This was especially asserted in the case of the artillery. It was freely stated that on this account the artillery was

able to fire twice as many rounds as in the same period of time with the old powder.

(III.) When the infantry was firing, brown smoke was faintly visible from the flanks; facing their fire, no smoke, or next to none, could be perceived.

(IV.) On the 20th and 21st September, artillery Officers were freely declaring that the new powder weighed half as much as the old, thus enabling double the quantity to be transported. These statements have been more than confirmed by experiments made only the other day at Magdeburg, when it was proved that, pound for pound, the new powder goes at least three times as far as the old.

(V.) These latest experiments further showed that the new powder does not half so readily cause the gun to heat as the old, and that it has the invaluable advantage of leaving the bore of the gun almost clean after several rounds of firing.

(VI.) The action of the powder in the tube of the gun, after ignition, may be described as being at first of an expansive character. In boating language it "gets the catch on" at the end, not at the beginning. It is only when the projectile reaches the mouth of the tube that the full expulsive power of the charge takes effect. The advantage of this quality may be tested with a common pea-shooter. By blowing into the tube moderately, till the pea reaches its mouth, and then giving a strong blast, the charge will carry farther and hit harder than if a strong puff is given at the beginning. So when the shell or shrapnel gets started within the tube the force of the explosion is not immediately exhausted. The projectile receives the final explosive push as it leaves the gun, and has no longer any friction to encounter from the bore.

Other qualities of the German smokeless powder which cannot exactly be classed as advantages, are (I), that, as an old General expressed on the field, "*Es stinkt ganz cannibalisch*"—it stinks abominably. (II.) It is said that the new powder, in exploding, puts a greater strain on the metal of the gun than the old. This statement, a stranger, as may be easily imagined, was afforded no opportunity of testing. But I observed that Herr Krupp, of Essen, was present during the whole of the manœuvres, closely observing the effect of the new powder on gun-metal. It was stated in many quarters that either new guns are about to be ordered or that the old bronze guns, which had been supplanted some years since, were to be reintroduced. At any rate, there is no bad record relating to the use of smokeless powder since the date of the last manœuvres. It will be interesting to see to what extent the smokeless powder will be employed in the approaching manœuvres at Flensburg, and whether the idea which occurred to me at the time, and which I mentioned in my despatches, will be realized in the employment of the new powder by the German ships-of-war whose participation will form so novel and interesting a feature in these operations. It would almost seem as if in naval warfare the smokeless powder were destined to achieve revolutionary results.

The German powder, by the way, is not, as was at first stated,

noiseless. The report, in fact, sometimes seemed louder, at least in the case of artillery, and was certainly sharper than when the old powder was used.

It was found at the French manœuvres of last year that the unsatisfactory results obtained from the employment of the French smokeless powder were chiefly owing to the want of a suitable blank cartridge. The new powder requires that the cartridge shall be provided with a suitable wad, else the expansion of the gases which are created immediately on ignition drives the greater part of the charge unexploded out of the gun. At the German manœuvres, the field-pieces which fired with smokeless powder are said for this reason to have had a bag of sand as a wad in front of the charge. This was possibly the cause of the resemblance of the artillery smoke to brown clouds of dust. The blank cartridges which were employed in the rifles had already been provided with a hollow wooden capsule having the outward shape of the conical bullet. Their original object was simply to give the blank cartridge the form required to make it fit into the magazine, which, of course, is constructed to suit ball-cartridge. These so-called German *Platz-patronen*, or bursting cartridges, are said not to penetrate a paper target at 17 yards, and may therefore be used with perfect safety for blank fire, while the French *fausse cartouche*, which is made of paper, is said to wound at 30 yards.

The manœuvres of September 21st, which formed a further illustration of the use of smokeless powder, I shall chiefly regard in the light which they cast on the employment of MOVABLE FORTIFICATIONS.

On arriving at Elze at six o'clock on the morning of the 21st, I found that the Xth, or Hanoverian, Army Corps had bivouacked and taken up positions on the distant uplands to the right, about an hour's ride from Elze. Thither all hastened to gain the central point of the Emperor's position, who on this day commanded the Hanoverians. When we arrived on the scene we found that what had happened was this:—The Eastern Army was supposed, with the aid of the Hanover-Alfeld Railway, which the Xth Corps had succeeded on the previous day in saving, to have concentrated upon Nordstemmen, so that the task of the Hanoverians had been fulfilled, and they could now choose a more advantageous position. This they had done by swinging round like a door on its hinges back on the uplands into a position at right angles with that upon which they had fallen back on the previous day. In fact, to resume the comparison with the Thames Valley at Oxford, the Xth Corps had fallen back upon Cumnor village as their centre, and faced towards the Thames at Oxford, with their left wing bending somewhat round towards the Thames.

The first point to be noticed was the extraordinary strength of the position. Over the Osterwald heights, which the whole of our right faced, the enemy could not possibly pass. The defile at Wulfinghausen on our extreme right might be forced, but it was found impregnable since the 19th, when defended by our battalion of

Chasseurs. The only way in which the enemy could get at us was round by the plain between Mehle and Elze, which was reconnoitred by our cavalry in the early morning. They would then attack our centre at Sorsum (situated like Cumnor) and our left, where our cavalry was massed, at Wülfingen.

Sorsum is a picturesque village at the foot of a conical hill covered with hazel shrubs. On a spur of the hill overlooking the village stands the church, a long narrow edifice with a high pepper-box tower, on the top of which a number of our Staff Officers were posted during the day with field-glasses, the better to observe the situation. On the slope rising behind the church the foreign Military Attachés were gathered. The Emperor and his Staff were on an eminence to the left. The village below was unoccupied by our troops, though the chalk marks on the doors showed that they had been quartered there on the previous night. The village was unoccupied because it lay too low to be of strategic value. The centre of our line was in front of the church, facing the opposite slope down which the enemy must advance. Here our entrenchments were strongest.

Never have I seen a position at once so strong by nature and so strongly fortified by art. Riding up to it in the morning, I first came upon lines of wire-fencing consisting of stakes four deep, with wire twisted across and along, absolutely impassable for cavalry, and for infantry most embarrassing. If the enemy's infantry ever reached the wire fences, they would stand an excellent chance of being annihilated while attempting to "warstle" through them. Next came our earthworks, line upon line of them. Behind them our infantry were nearly as safe as in their beds. On the heights behind, our artillery Officers were absolutely chuckling over the strength of our position, and foreseeing what havoc they would work among the enemy when he came down the opposite slope.

And now the battle opened, our outposts retiring from the opposite heights, soon followed by the advance columns of the enemy. I shall not detail the events of the battle. The enemy's loss must have been terrible while coming down these slopes, and also in retreating up again as fast as they could, for they were exposed to our full artillery and infantry fire.

What I wish particularly to notice was the employment for the first time of the movable fortifications about which I wrote in the "Morning Post" in 1888, when Major Scheibert's treatise on the subject appeared. These fortifications are known in Germany as Schumann's armoured turrets, and are constructed in Gruson's works at Magdeburg. It is well known that heavy armoured turrets were constructed years ago in Gruson's works, and that they were adopted for the fortifications of almost all European countries; also that they gave excellent results in experiments conducted at Bucharest and at Spezzia, which excited European interest at the time. These armoured domes, however, were very expensive, and their weight was a great drawback. A new movement had arisen which was distinctly adverse to the high opinion formerly entertained of the

strategic value of great permanent fortifications, and which favoured the construction of improvised defences.

The exponents of these opinions directed attention to the tremendous military expenditure involved in great fortified places like Metz or Strasburg, and they pointed out the fatal attractions which such strongholds have possessed for great armies during recent wars. Even the brilliant achievement of the defence of Plevna is regarded by these critics as merely constituting a crowning proof of the superior excellence of improvised defences, and, on the other hand, as showing with what certainty the resort to the permanent shelter even of entrenchments leads to a disaster which might have been replaced by a series of brilliant movements, such as would have inflicted an equal loss on the enemy without the ultimate sacrifice of the army which inflicted it.

The late Lieutenant-Colonel Schumann, therefore, devoted his attention to the construction of an armoured turret, whose superior lightness might enable it to be transported by troops in the field. His object could only be achieved by sacrificing to a certain extent the power of the turret to resist the enemy's fire. He constructed two types of turrets armed respectively with guns of 1¼-inch (3·7-cm.) and 2-inch (5·3-cm.) bore. These turrets are only proof against bullets and shell splinters, while they cannot resist the full impact of heavier projectiles. But since the small turrets cannot become direct targets for artillery without excessive waste of ammunition, they may be regarded as practically shell-proof.

The turrets, each of which contains a quick-firing gun, are placed in position in the infantry trenches, and strengthen the lines. They are transported on specially constructed carriages. For a quick-firing gun of 1¼-inch (3·7-cm.) bore, the turret consists of a cylinder of 38 inches in diameter, which is protected by steel armour in the shape of a cupola or case, having a thickness of 1 inch (25 mm.) (see Plate). The quick-firing gun is capable of firing a maximum of 40 rounds a minute, and has no recoil. One man suffices for the service of the gun and for the management of the turret, which rests upon a revolving pivot. The gunner sits upon a saddle like that of a bicycle, while there is room in the back of the turret for a second man, who hands up the ammunition. The gunner can turn the tower on its pivot, and lower or raise the gun, so as to direct his aim.

156 metal cartridges can be stored on the floor of the interior cylinder.

The weight of the turret is—

| | | ton. | cwt. |
|---|---|---|---|
| | 1,400 kilos. ..... | 1 | 7½ |
| or | 1,500 kilos. ..... | 1 | 9½ |

The weight of the carriage is

| | | | |
|---|---|---|---|
| | 540 kilos. ..... | 0 | 10½ |

The 1¼-inch bore (3·7-cm.) fires shell and grape-shot containing 18 bullets. The initial velocity is 444 yards.

The range for shells is 2,734 yards.

The range for grape-shot is 328 yards.

The heavier form of field-turret containing the 2½-inch bore gun (5·3-cm.) has an interior cylinder of 77-inch diameter. The thickness of its armour is about 1½ inches.

The weight of this turret with gun is—

| | tons. | cwt. |
|---|---|---|
| 2,570 kilos. ..... | 2 | 10½ |
| Carriage weighs 690 kilos. .. | | 13 |

The gun fires grape-shot with 78 bullets and shrapnel containing 56. Range for shell about 3,500 yards, for grape-shot about 437 yards.

A more elaborate form of the armoured turret was devised by Schumann in order to afford greater protection for the gunners. By an arrangement of balances and weights the turret is made so that it can be raised and lowered from within. The external cylinder is sunk into the soil, and the roof, when the interior cylinder is lowered, is level with the ground. These turrets are much more heavily plated than those I previously described—the thickness of the armour being 4 inches (100 mm.). The weight of the turret is 12,500 kilos. or about 12 tons 6 cwt. The guns are the same as those already described, and have the same range.

Turrets are also made of a still heavier weight, and constructed to carry howitzers and mortars of 4¾- and 8½-inch calibre, the weight of the turret of this last description being 80,000 kilos. or 78½ tons. These last turrets, of course, are not intended for transportation in the field, and are, indeed, constructed to rest inside a sunken cast-metal cylinder built into the ground. (See Figs. 4 and 5.)

For the purposes of improvised fortifications the lighter transportable turrets for 1¼- and 2⅜-inch guns are of immediate practical moment (Figs. 1, 2, and 3). They can easily be stored in depôts and forwarded by rail. These turrets, mounted on their carriages, would certainly be able to traverse short distances on the field, where the roads are not too heavy. They may thus be expected to meet all the demands of purely temporary fortifications.

At the manœuvres of last autumn the turrets were mostly sunk into the ground in the entrenchments. Eight turrets in all had been placed in position at regular intervals along the infantry lines. There was certainly, in view of the hilly nature of the ground on which the infantry of the Xth Army Corps was entrenched, considerable difficulty in transporting the turrets on their carriages. I observed about twenty soldiers with an auxiliary force of villagers dragging one of the turrets along a rough country road. Smokeless powder was employed in the guns, but it gave a bright flash at every discharge, so that the position of the turrets (though they were painted the colour of the soil) could be distinguished by the enemy. Their advocates, however, argue that even if artillery, after much trouble and waste of

ammunition, should have destroyed one, it would be a slight loss compared with the execution the turrets can inflict. The gunner in them has a sense of security which greatly adds to the deadliness of his aim. The guns are said to be particularly effective when firing solid shot against cavalry.

Against great permanent fortifications the besiegers now bring ordnance of tremendous weight, and the newest inventions of explosive projectiles are calculated to make the strongest forts tremble. The besiegers can also, by an energetic and well-directed attack, prevent the defenders from occupying or maintaining positions in the intervals in a line of forts. It is evident that the method of attacking fortifications has received a new and wide development, and has become a much more elaborate and interesting department of strategy than it was in the days of Sebastopol or even of Strasburg. In France as well as in Germany there exists a strong tendency to avoid in the future the error of staking too much upon the defensive strength of permanent fortifications; and there also exists a belief that more will be achieved by developments in the construction of improvised defences—a branch of strategy in the future of which the transportable armoured turrets may very probably play a prominent part.

I would ask permission to conclude this paper by giving a brief summary of the considerations which, it is anticipated, would predominate in facing the next great European campaign. This summary, I am enabled to state, is in general agreement with the views of the German General Staff.

Accuracy of aim and range of weapons of precision have marvellously increased since the last great war. Only the other day a few Austrian marksmen were able, in an incredibly short space of time, to annihilate the whole personnel of a battery (represented by dummies) at a distance of 1,400 yards. Artillery operates with shells from a distance quite out of the range of unassisted human vision, and with shrapnel up to a distance of 2,200 yards; in both cases with deadly precision. Shells filled with explosives wreck buildings and walls with unprecedented rapidity. The newest rifle works so quickly that the marksman is in a position to fire twenty unaimed and twelve aimed shots per minute. The penetrating force of the bullet from the small-bore is so great that it goes through the thickest tree trunks as well as earthworks of 18 inches thick, as if they were butter, and such cover no longer affords any protection for human life.

It is not, however, anticipated that the progress made in weapons of precision will result in an increased loss of life in future campaigns. The more primitive the weapons of warfare were, the greater, as history shows, was the sacrifice of the lives of the combatants. With the old muzzle-loader the combatants approached so close to each other that almost every shot told. Nowadays troops are never allowed to charge until it is believed that the enemy has been so demoralized that he may be safely approached at close quarters.

Thus the fortune of war is becoming more and more dependent on the *morale* of the opposed armies.

The increased precision and range of aim has also the effect of causing tactical advantage to be more decisive and to be more rapidly won or lost, as no commander would be willing, lightly, to incur the risk of exposing his troops to the well-aimed fire of the new magazine rifle, by a want of rapidity of decision, whether in ordering an advance or a retreat. Movements in the field will, therefore, be executed with increased rapidity, which will impart a new excitement and a greater liveliness of aspect to the battles of the future. On the other hand, it is not improbable that the same factors will produce a certain stagnation in the conduct of modern campaigns, owing to the cautious tactics which the deadliness of the new weapons of precision will enforce. The functions of great masses of cavalry, however, will become more important than ever. These will be the eye of a great army, as they will also be the veil which shrouds it from the enemy. The cavalry masses of the opposed armies will first encounter each other, and will put it to the issue which army has the keener eye and the closer veil. This development will lead to great cavalry battles initiating every great campaign and every important operation, where the nature of the ground permits.

The excellence of weapons of precision will, it is anticipated, redound pre-eminently to the advantage of troops acting on the defensive. It is, in fact, regarded as probable that the great battles of the future will more than ever have to be fought out on the wings, and that the success or failure of flanking movements will generally determine the issue of the combat.

Smokeless powder, in particular, will confer a preponderating advantage upon troops on the defensive, as the attacking force will have the greatest difficulty in discovering the position of lines and batteries which have the advantage of good cover, while bodies of men moving to the attack in the open will almost invariably fall victims to the deadliness of the defenders' aim. The task both of commanders and of cavalry patrols in endeavouring to discover the position of the enemy will be rendered much harder. Cover which protects troops from being seen will be as valuable as actual cover against fire has hitherto been. The choice of a position and the disposition of troops, so that the advantages of invisibility, as conferred by the smokeless powder, may be made the most of, will form the first care of the tactician.

In view of the great space which will be required for the movements of twelve to fourteen Army Corps on each side in a great campaign, it seems doubtful whether, either in the marshes of the eastern frontiers of Germany and Austria or on the hilly ground of the western frontier of France, scope will be found for the development of a battle which, under the conditions of modern warfare, involves an extension of front covering over thirty miles.

For the vast armies of to-day, the question of communications, and, above all, the importance of railways, will assume a fresh prominence, both in view of the commissariat and of rapid mobilization. More

than ever will the success or failure of the earliest operations of the campaign, which depend upon rapid mobilization, exercise a decisive effect upon the ultimate issue.

The speed and promptness of strategic operations which will be necessitated by the vast numbers of troops to be manœuvred, as well as by the considerations already indicated, will deprive great permanent fortifications of their former importance. They will only play an important part at points which cover difficult and unavoidable defiles, fords or bridges, embankments across marshes, &c. In all other cases the invaders will simply seek to avoid the strongholds and pass them. But even where the siege of such strongholds is undertaken, the besiegers will enjoy advantages through the employment of the new heavy ordnance and the new projectiles, out of all proportion to the progress which has been made in the art of fortification.

One important question which, more, perhaps, than any other, interests England, is the relation which the military security of a country bears to the number of troops which it can put into the field. The views which I believe to be entertained in Germany by those best capable of pronouncing an opinion on this score are distinctly in favour of the superiority of the army which is best disciplined, best equipped, best led, over a rival who, while stronger in numbers, is somewhat inferior in these regards. For the training of every single private acquires a high importance in view of the necessity that he should be familiar with the complicated mechanism of his weapons, and skilled in their employment. Good shooting has become indispensable. Ammunition must be carefully economized, and every shot made to tell. As General von Caprivi said the other day in the Imperial Diet, the whole physiognomy of Berlin has been altered in the last few years by the growing demands of drill and education upon the German private soldier. He is now hardly ever to be seen on week-days in the Berlin streets, and on Sundays he is no longer observed in the agreeable company which he used to affect, as he has no time during the week to strike up tender acquaintanceships. General von Caprivi added that when he entered the army it was considered sufficient for a private to fire some twenty rounds in the course of a year at an easy target, and the only question ever asked was: "Did the rifle kick badly?" Now the German private had to fire a minimum of 150 rounds, and his training had become most exacting and severe.

The demands of modern warfare are more than ever in the direction of requiring a superior *morale* in the individual soldier. The total absence of fear based upon calm reflection rather than upon temporary excitement, the coolness and self-command which have always given the great armies of history their advantage over their opponents, will more than ever stand the troops which possess them in good stead. They will facilitate that accuracy of aim, and that economy of resources which are the conditions of success with the new rifle and the extended range. The difference between the cool marksman and his excited neighbour is nowadays calculated with arithmetical accuracy.

There is probably no one who is familiar with the composition of the armies of Europe who will be prepared to deny that Great Britain possesses raw material capable of being very highly educated in the military virtues to which reference has just been made, and that she possesses this particular material to an extent equal if not greater than her Continental neighbours.

Similarly, the education of Officers in view of the conditions of modern warfare has become a matter of overwhelming importance. The Germans believe that the traditions of the last eighty years, and the present thoroughness and success with which this department of military efficiency is cultivated amongst them, give them an incontestable superiority over their neighbours on the Continent. But an Englishman—whose lot makes him a stranger within their gates—may claim with justifiable pride that the traditions of the British Army in respect of its Officers are in no wise in danger of being unworthily maintained, and that the testimony, based upon his last year's visit to Aldershot, of one of the foremost German soldiers of the younger generation, the Emperor William himself, has both in public and in private in his own country, as when he was in England, been heartily and unreservedly warm in its recognition of the soldierly attainments and the brilliant capabilities both of British Officers and men.

Major-General J. KEITH FRASER, C.M.G.: Sir, I think every one here, of all branches of the Service, feels that we owe a debt of gratitude to the lecturer for telling us so much as he has done on many topics. No branch of the Service can be more grateful to him than the one to which I belong, the cavalry. It is the first time I have ever heard anybody not connected with the Army speak in this room in the sense in which he has done. We can all remember that for very many years numerous Officers of the Army have spoken here in favour of increasing our cavalry, of the use of cavalry, and the future of cavalry. It is now a great many years ago since Colonel Valentine Baker stood and argued the point here with everyone. No result, as far as I know, has ever taken place. There has been no increase to our cavalry. We all remember the unfortunate state, owing to numbers, of our cavalry that went to the Crimea. Several here are present who saw it. It is to be hoped, now that one not connected with the Army has spoken, perhaps public attention will be drawn to the enormous disproportion there is between our cavalry and the other arms of the Service. If you look at Continental armies, you will find the cavalry is in large proportion; in our Army it is ridiculously small. I believe there is no country in the world, except Denmark, with so small a proportion of cavalry, and Denmark has no India to protect, no Egypt, no South Africa. In all parts of the world our cavalry are to be found. Talking of masses of cavalry, it is very interesting to hear of them, but unfortunately English cavalry soldiers can never see anything approaching to masses of cavalry. It is impossible at present, unless a great change comes over the country. The feeling of this great horse country seems to be always strangely against cavalry, and I believe nine people out of ten you meet with, unconnected with the Army, will tell you the days of cavalry are over. Well, they said the same, no doubt, before Brown Bess and powder were invented, and they will keep on saying the same; but each time cavalry goes out, it comes more to the front, I think. The lecturer spoke of the weapons of cavalry. I think the first weapon the cavalry soldier has is his horse, and no doubt our greatest difficulty is our horses. We have no reserve of horses. The reserve General Ravenhill has so admirably managed to obtain is hardly fit to be sent straight into the field with cavalry soldiers on their backs, and to send a cavalryman to fight against well trained horses and men in foreign armies, unless he rides himself a trained horse, is

really murder; for instance, to send a man out on outpost or reconnaissance on a horse that, perhaps, has never had a bit in his mouth. I think some went to Egypt that had never had bits in their mouths. I hope this lecture will do us great good. All those who have seen the German or Austrian cavalry manœuvres know how the great masses of cavalry are manœuvred, how they come up from, as it has been well described, "hull-down," and suddenly change the face of the whole battle. When the infantry is exhausted, even in mimic war, the sudden appearance of great masses of cavalry upsets the whole arrangement. So I think it would be in war. The lecturer spoke of the American War. There cannot be a better study than the American War, to see the admirable way in which the cavalry, not only on the Southern but the Northern side, were managed, really as cavalry, and not only as mounted infantry. They were used as cavalry; they dismounted when occasion required, as every cavalry ought to do, and I maintain cavalry ought to take care of itself. Every cavalryman ought to have his carbine, and be able to take care of himself, without asking the support of infantry. He is no use if he cannot take care of himself. I think it is rather an indignity to cavalry to think that they require mounted infantry to protect them. With reference to the use of dogs in war, it has happened to me to know the great use that is made of dogs in Bosnia and Herzegovina. There are quantities of dangerous people about in the countries near Montenegro, and the Austrian troops use these dogs as messengers. They are found most useful in sending messages from the rear of a column to the front, &c. Of course, naturally, the shepherd's dog is generally the most intelligent and the best, and the extraordinary journeys they will make across hills and places where horses, and even men, could not go, is quite wonderful. I have in my possession a return of the distances and of the extraordinary saving of time that has been effected by these dogs. As Colonel Schumann's fortifications have been alluded to, it has also been my lot to see a great deal of that system. Colonel Schumann was a friend of my own. He unfortunately died last year. He was certainly an extraordinary man. About three years ago I was staying with him in Roumania, and he made me a convert entirely to his system. In Roumania there are many hundreds of those guns prepared to send at any moment to parts where danger is threatened. They have several hundreds ready to send to the great line of defence between Focsani and Galatz, and if they are suitable to that country, I think they are still more suitable to England. They are very inexpensive. Earthworks can be run up very quickly by infantry, and if you have a mass of these guns ready to send at any moment to any threatened point, they make it really almost impregnable. They are very difficult to hit. In a potato field they are not visible: in strawberry beds you could not tell if they were there. They are very difficult to hit indeed for big shells, and even if they are hit, it is only one gun and two men gone if the whole thing is destroyed. I think they would be admirably adapted for some of our defensive positions.

Lieutenant-Colonel T. S. WALKER: I should like to ask one question about the manœuvres. I happened to be there the whole time, and should be very glad if the lecturer could give us some enlightenment as to what occurred on the last day. We all admire the German soldiers immensely—no one could help doing so—but yet they are far from immaculate, and I witnessed some proceedings along with other English and French Officers on the last day, of which I should be glad to have an explanation. An attack was made by one corps against another in an entrenched position, commanded by the Emperor; the supreme attack was made against the left flank of the defenders; everything proceeded in the stereotyped manner up to the point where we all expected the final rush to be made. The assailants were to the defenders as about two to one. Quick firing had already commenced, and we momentarily expected the final effort, when, to the surprise, I may say the bewilderment, of the onlookers, all of a sudden the defenders, contrary to the dictates of tactics, stood up, sprung over the crest of the parapet, and formed in line. Not a shot was fired: they were there for a few seconds, and then they advanced against the attackers (who were firing at them all this time), about 30 yards in line, when it seemed to dawn on them that it was necessary to fire also, and they went down on their knees and began firing. Some one came up to the Commanding Officer of the attacking force, and evidently they had to withdraw,

and they were as surprised as we were that they had to do so, because everything betokened a success, as far as our ignorant vision could make out. They also retired in the same way, without firing a shot, without alternative battalions or companies halting, firing, and retreating, at the double; they retired just like a flock of sheep. I think, perhaps, if the lecturer was there, he might throw some light upon it. It suddenly dawned on one of the Commanding Officers of a battalion that it was necessary to fire on the defenders—now the assailants; he did so, but he was left in the lurch; the others did not help him, but left him alone; he was assailed by cavalry and was annihilated in the spirit. Now, I admire the Germans immensely—seeing them on parade they are admirable—but if that had occurred at Aldershot, you reporting gentlemen would have had it next day in all the papers. The German reporters are not allowed to utter a syllable as to what takes place, so that it does not appear in their papers, fortunately, or, perhaps, unfortunately, for them; consequently, I have never been able to find out why this occurred, who was at fault, and why all the principles of tactics, so far as I can grasp them, were not followed. Perhaps you can tell me.[1]

General Sir CHARLES SHUTE: I do not think I can pay our excellent lecturer a greater compliment than by saying that he has left us no opportunities for debate. He has placed before us a number of unquestionable and valuable truisms, and truisms that I wish we could impress upon the public of this country in general. The fact is, that we are governed by a democracy, and it is absolutely necessary that they should know the real value of cavalry and horse artillery, in order to induce them to pay for a very expensive force being in an efficient and thoroughly good condition, and this is best impressed on them by a civilian like Mr. Saunders lecturing on the subject. The fact should be impressed on the public that our cavalry is now in skeleton, and yet that, if they could not take the field as to strength, in due proportion to the force to which they should be the eyes and screen, and always miles in advance, they would in civilized warfare be almost valueless. It would be utterly impossible that they should be the eye of a General Officer, nor could they cover his operations, because the cavalry of every other country would proportionately so much outnumber them that it would be utterly impossible for ours to keep the field. We know well that cavalry is entirely an offensive force, and cannot act on the defensive, and that if they are very much outnumbered, and their quality is not so sufficiently superior to the enemy's as to compensate for want of numbers, that they are certain to be obliged to give up their forward position to the enemy; our own Generals would be thus blinded, whilst their every movement would be known to their opponents. But besides the more ignorant of the tax-paying public, the cavalry and horse artillery have but very doubtful friends in the many Officers who have risen to high positions on the Staff through experience (never having commanded regiments or batteries) of savage warfare, which may, I fear, prove as inferior a school for ours as Algeria did for French Officers. In our little wars that we have now been so accustomed to for many years, there has been no opportunity given us for opposing, or for employing

[1] On leaving the lecture hall the other day, Captain Adie, who witnessed the foregoing apparent incongruities in tactics, informed me that the German official interpretation of the subject-matter was, that the attackers had been so completely crushed by the overwhelming artillery fire of the defenders, that they were completely *hors de combat*. This verdict, however, I challenge, as the attackers at the decisive point of the battlefield had such a preponderating force, both of artillery and infantry—in cavalry only were they much weaker. Moreover, even if the assumption that they were crushed be maintained, why should they have been allowed to advance close up to the position? They ought to have been previously retired, and most emphatically the defenders should not have sacrificed the advantages of cover, they, in consonance with the first leading principles of tactics, should have followed the retreating army by fire only; but on this occasion the assailants had not retired, and yet for some distance, they were advanced against in line, and without a shot being fired. A most unrealistic picture was drawn of a modern battle.—T. S. WALKER.

cavalry and horse artillery, and all practical knowledge of their value seems lost to us. We are opposed to an enemy that has hardly got a pair of trousers to wear; certainly much less dragoons or horse batteries. I agree with my friend General Keith Fraser, that we are sadly behind the times in these matters, and it is only by gentlemen—more particularly by civilians like the lecturer—impressing these truths on the British public, that there is any chance of our improving our present position. One word with regard to the cavalry Reserve. We are all, or most of us, practical soldiers here, and we know perfectly well that the cavalry Reserve must be almost valueless if they are never called out. We know quite well that a dragoon that has not seen a horse for eighteen months is not worth a rap, and would not be for at least six or more months. Therefore, in point of fact, it is absolutely necessary that our cavalry and horse artillery should be kept in a more efficient and stronger state than we are inclined to do at present. The Germans, acknowledging this truth, always keep up their cavalry regiments to within a few sabres of their war establishment. There is really nothing the lecturer has said with which anyone can possibly differ, and I will only, therefore, again repeat that I think his remarks, as regards the cavalry, are most valuable for the British public.

Major Walker Smith, R.A.: I have risen, Sir, more than anything else to ask the lecturer if he will kindly give us information on one little point with reference to the question of smokeless powder. The question is one which had previously struck me as demanding more specific information than we now possess, viz., what would be the influence of smokeless powder on the attack operations of an ordinary battle. In the forest slopes fought over in the earlier of the two great actions described by the lecturer, we hardly find features normal to the ordinary battlefield or field-day. The ground appears to have been thickly covered with woods and undergrowth, and both forces were the whole time kept more or less "upon the run." I can certainly imagine that upon ground so conditioned the superior qualities of smokeless powder would stand out in very strong relief. Whether it would do so in the normal attack over a perfectly open and even glacis, like the St. Privat slopes, is to my mind the problem now requiring solution. We all know in the discussion of battle tactics what tremendous importance is attached to bringing up the supports and reserves, the second line, and so on, tolerably well screened *by their own smoke*. We know something too of the advantage conferred on company leaders even by the little smoke of ordinary field-days in leading their men to the attack. Now, by the adoption of smokeless powder all this is swept away. It is open to question whether the formal attack over the fire-swept glacis may not be more fairly regarded as the normal type of present day collision, than the running combat in the instance dealt with by the lecturer, and it would be interesting to know his opinion as to the effect of smokeless powder on the tactics of the attack in the (probably) more numerous cases that I refer to. There is one other point of some importance, to which I would ask permission for one moment to advert. The last speaker, General Shute, told us that the lecturer's paper was so pertinent and sound as to leave us no room for criticism. I think I must make a slight exception to that. Admirable and most interesting as the lecture undoubtedly was, I did rather regret, for one, the little burst of optimism with which it closed. I know the leading journals on both sides of politics are unfortunately in the habit in this country of giving their correspondents a brief to "write up" the British Army and the British system in every possible way; and I believe that this custom has exercised a most deleterious influence upon the Service. Possibly however, after all, I am not so much at divergence on this point with the lecturer. He speaks of the admirable "raw material" that we have in the Service, both of Officers and men, and there we are beyond doubt thoroughly in accord with him. The question is—Is it anything more than raw material; or, is it not the fact that the material from the German and Continental point of view is exceedingly raw indeed? Let me give you one single illustration, taken from an important topic mentioned by the lecturer himself, namely, the capacity of the German soldier for enduring immense fatigue, working day and night, both in peace and war, in barracks and in field operations. My own observation of the work done by German soldiers entirely confirms his view. Whether our own men are capable of similar uncomplaining endurance, is a question which

may or may not be answered in the affirmative. I maintain, however, that you do *not* find that the average British soldier of any one arm of the Service is worked, either for athletic or instructive purposes, to anything like the same extent in our own country. There is a query I have often heard started in the course of conversation at Aldershot and elsewhere, and notably during the discussions arising out of the field days of the last summer—Why do we not exact more hours' labour from the soldier, in order, on these days, when an adequate training is the one paramount essential, to teach him his work? The answer you get from two Officers out of three is this: that in our Service the troops are enlisted on the voluntary system, that it is impossible to exact more from the men than is now the case, that they will not stand severer work, and that even now they have been known to evince mutinous tendencies after a very ordinary degree of good marching. I only tell you what has been remarked to me, without in the least endorsing it. Heaven forbid that it should be true! I do trust we have not in our Service fallen quite so low as that, but I wish to quote this as an illustration of the deplorable results which may be traced not remotely to the language of over-optimism which in this theatre and in the press we are always adopting about our own Service and our own arrangements, while we turn a blind eye to some of our most serious defects.

Captain J. M. GRIERSON, R.A.: Having had the advantage of going through the manœuvres last year from the beginning to the end, and also the pleasure of meeting our lecturer there, I should like to be allowed to say one or two words. First, as to smokeless powder. I entirely agree with what he has said, and I only wish to mention the enormous latitude it gives to field artillery in their choice of positions. In the attack of the VIIth Army Corps on the second day of the final manœuvres, their guns were placed in three lines in rear of one another, firing over one another. That would have been absolutely impossible with the old powder. In a country where positions are cramped, the use of smokeless powder gives an enormous advantage. With regard to the turrets, I think that is a point on which military opinion in Germany is very diversified. I do not think the Germans approve generally of them. They think them artificial, heavy, and complicated. They may be of use in defensive positions previously prepared, but they probably never will be where they are wanted, and they certainly are no good for offence. Last year, one point that struck me more than anything else was the excellence of the Umpire Staff. In our manœuvres we detail regimental Officers as umpires. The Germans detail their very best Officers for the work, *i.e.*, those of the Great General Staff in Berlin. Wherever the troops got near one another or otherwise the situation required a decision to be given, there was an umpire on the spot. There was no putting troops out of action, piling arms, and lying down, thus introducing a state of things which looks only ridiculous. The troops went back when they were repulsed, the fight surged backwards and forwards, and the resemblance of the whole thing to real war was enormously increased thereby. That can only be done if umpires are men who have received the training which the General Staff in Germany have, and which any General Staff ought to have. The final impression left on my mind by the manœuvres was that the introduction of this smokeless powder and the probable use of cavalry in masses are entirely in favour of the British Army. Our cavalry have always shown a decided preference for cold steel, and I think smokeless powder gives an enormous advantage to the offensive defence, which is the traditional style of fighting of the British infantry.

Captain MIDDLETON: With reference to the use of dogs as messengers on the battlefield, I should like the lecturer to tell us how the dogs were conveyed along with the troops, because I think, if they followed the troops over a rough country, hedges, and ditches, and so on, they would have rather a bad time of it. Did they follow across country, or did the conveyance taking them keep to the main roads? Another point is as to the effect of firing with smokeless powder, and as to the difficulty of determining the distance and direction of your enemy who is using such powder. I should like to ask, Were there any range-finders about? There must be a certain amount of report, and that would give some idea as to where the guns were, and a few trial shots, either from the artillery or from our rifles, considering that the rifle fire extends to 3,400 yards, would make the enemy show themselves

somehow or other. Major Smith referred to the length of time that men are drilled now. I think the British raw material is not worse than the German, but the age of the German raw material is slightly over that of the British. The German raw material is taken at a certain age (twenty years), and I am afraid a good many of our recruits are only sixteen years old.

General Sir JAMES HILLS-JOHNES, V.C., K.C.B.: I do not wish to make any observations upon the lecture, because I lost half of it through coming in late, and I consider the rest of it was very much to the point, and will be most useful in bringing the subject to the notice of the public. What I wish to do is to ask about the movable fortifications; how are they worked? I suppose they go with the attacking force as well as with the defence. Now, you cannot find trenches when you are advancing, and if they are used in the advance, is the outer part of the machine made of steel? Is it bullet-proof, or are you obliged to make trenches for them? And again, I should like to know what the range of vision is of the man who is inside. As far as I can judge from the drawing, he can see out of only a very small hole, and by the lie of the ground may not be able to see more than 100 yards or so. Has this weapon a lateral range of fire of any extent? As far as I can see from the diagrams, the cost of working a very heavy machine like this movable fortification, drawn by one or two horses, would not be repaid by the amount of fire which as a rule would be obtained from it. Of course, in a defensive position, if you can choose your spot to place these batteries, I can understand them as being most useful: but if you have to take them up in a hurry, and use them when you are advancing or retiring, the ground will probably be found unsuited to them, and therefore, as far as I can see, I do not think they would be of sufficient value to the Army to repay the State to have them, except in defensive works.

Lieutenant-Colonel E. GUNTER: I should like to add my testimony to the very great interest with which we have listened to this admirable lecture. I only want to say one word with reference to what the last speaker referred to, namely, the portable turrets. Notwithstanding the enthusiastic way in which the lecturer has spoken of them, and which has been confirmed by General Keith Fraser, who had personal experience of them, I do hope that we shall never adopt anything like them. I think the use of such improvised iron fortifications, either in the attack or defence, would be something like going back to the old days of plate armour and iron helmets, and visors, and all that. I think if fortifications on a large scale chain the troops who are to defend them, so in a smaller way would these improvised temporary smaller fortifications hamper them. I think true value in defence, as well as in attack, will consist in increased mobility and activity, therefore, any such improvised fortifications, however well they may work in theory, must be detrimental in practice.

Colonel BAYLIS, Q.C.: Will you excuse me for making a few observations. I may say we are all exceedingly pleased that a civilian should have contributed so much interest to this theatre; and civilians, according to many most distinguished Officers who have spoken here, have done much good for the Services by their contributions to the lectures of the R.U.S. Institution, and expressing their opinions freely in the discussions. I agree very thoroughly with what has been said by one or two General Officers, that it is not only from the Services themselves that these suggested improvements will arise, but from getting public opinion to bear upon the subject, by papers and discussions here; and when a civilian comes forward and gives his valuable assistance to this end, as Mr. Saunders has done, we are very grateful to him. As an old Volunteer Officer, I can say myself that I believe the Volunteer Force has done a great deal of good in bringing military matters, of which, as civilians only, they were ignorant, more before the public, and making the public feel that they ought to do more for, and appreciate better, the services of the Army and Navy and of the general services. One question, with reference to smokeless powder, has occurred to me; we, no doubt, when out shooting partridges and pheasants, are very glad to have our smokeless powder, and so have a second shot with the other barrel; but then we must remember they cannot shoot back at us. Is not smoke a great protection in the face of an enemy? It has its disadvantages no doubt. By the use of smokeless

powder you may be able to see your enemy, but you will remember you are seen by him also, and I have understood that if you can approach your enemy in a fog, or smoke, it is a very great assistance to an advance against a defending force. I was told by Lieutenant Harwood, R.A., who was one of the Officers who, at Inkerman, directed the two guns against the smaller guns (12-pounders) of the Russians. He said, "When those two larger guns were brought up at Inkerman, we could not see the enemy, through the smoke and the fog. What did I do? I could only fire at the flashes of the enemy's guns;" showing the advantage of obscurity to the enemy in making an attack. I think we have heard of instances in which it has even been found very useful for ships to create smoke in order to pass unobserved under the batteries of the enemy. I, therefore, cannot think that smokeless powder will always have the advantage.[1]

Colonel R. S. LIDDELL (late 10th Hussars): With reference to what has been said by Sir Charles Shute, I should like to ask the lecturer one question. He spoke of the daily increased estimation in which cavalry is held in Germany, and in the other Continental nations, and of the large number that has been added in the last few years, that ever since the war of 1866 there has been a continual increase of the German cavalry. I should like to ask him whether the numbers of the cavalry are in any way built up by the cavalry Reserve in Germany, because in this country I know people think that, although we are very weak in cavalry, still it is all right as long as we have the cavalry Reserve. When I was in Germany a few years ago, I was told that the cavalry soldiers, after three or four years' service in the ranks, were sent into the Reserve, but never were those cavalry soldiers permitted to come back to the cavalry; they were employed in the transport or in some other way, but they are never permitted to come back to the cavalry. If that is the case, it seems that we are rather risking matters if we are always to depend upon our cavalry Reserve.

Mr. SAUNDERS: I am very grateful for the extremely kind reception which my paper, being a paper by a civilian, has received. I feared it might be rather an infliction upon an institution like this, but I hope I have been able to say something of interest if not of value. I feel in replying especially that I labour under disadvantages which some of the speakers have said would very probably attach to an attacking force using smokeless powder,—that is to say, as a civilian, I am advancing in the open against a smokeless fusillade which is sure to puzzle, and which might very well annihilate, me. I am also very grateful to General Keith Fraser for adding so much that I did not know. It happened, to my very great satisfaction, that he bore out some things which I said about the movable fortifications. It was extremely gratifying to me to find this, as of course my information was necessarily somewhat of an incomplete character. With regard to what Colonel Walker said, I remember I think having the pleasure of talking to him on the field, but I am not quite sure that I remember seeing him at the precise position whence I witnessed the operations to which he referred. He asked with regard to the last day's manœuvres why the defending force got out of their trenches and stood up and advanced in such a fashion as to expose themselves to a murderous fire from the other side, and also why the other side did not, under these circumstances, attack them. I suppose that if this had actually occurred it would very likely have been said by the observers on the field that it was because the Emperor was himself commanding the defending force, and that success was intended for his forces. But that really was not the case: there is no doubt, I think, that battle was fought fairly out, and I think, so far as I can reply as a non-professional man to that question, the real fact was that our position was so tremendously strong (I was with the Xth Corps on this occasion), and especially the fire of our artillery was so very effective, that really those troops with which I suppose Colonel Walker to have been, coming over the hill, were all smashed up before they got near us. When our men left their trenches, in fact, Colonel Walker's side was already decimated. There was one battalion of the enemy's chasseurs, I remember, which came up in the most plucky manner; they

[1] Hence the idea of Colonel Crease's smoke balls, lately tried.—ED.

certainly fired their last cartridge; they came round the corner till they got close to our lines, they came close up to us, and the Umpire ordered them to cease firing till he could decide whether they were annihilated,—and he finally decided that, though probably they would have been absolutely annihilated, yet such a movement in the case of a forlorn hope might really do some good and might have weakened our positions, and therefore be allowed them to march off the field with the honours of war. But I think it must probably have been further on the left flank where the particular instance occurred to which Colonel Walker referred, so that I am unfortunately not able to give him full information, not having witnessed it. My own impression is, if it did occur, it was because our artillery and these turrets too must have done a very large amount of execution before the enemy came near us. Then with regard to what was said about the advantage of smokeless powder to troops on the offensive. I admit that it would be a very serious matter indeed for troops coming up over open ground and encountering a smokeless fire. In summing up at the end of my paper, and expressing not my own views by any means, not expressing views on my own authority, but expressing what I believe is considered in Germany to be likely to occur, I said that smokeless powder was expected to confer preponderating advantage upon troops who occupied entrenched positions, and that for the attacking troops under the circumstances which were assumed by the speakers it would be a very serious matter indeed, and very difficult for them to do anything at all. There is no doubt smoke is in some circumstances a great protection for troops attacking. General Sir James Hills-Johnes said that the circumstances in which I described the battle of Osterwald were abnormal; that it took place in a forest, and therefore there was considerable difficulty in judging this battle by ordinary standards. That was perfectly true, and I said so at the beginning of that description, both from the fact that the battle took place on the edge of the forest, and from the fact that it was extremely misty and rainy weather, so that the smoke lay along the whole forest, and obscured the line very much more than would have been the case under other circumstances. It was certainly a particular kind of day, but it was also in that sense rather a test day. The day and the ground were very much to the disadvantage of the old powder: but, on the other hand, the circumstances were admirably calculated to test the smokelessness of the new powder and its consequent advantages. It was shown clearly on this particular day that the new powder had absolutely no smoke, because, although the atmosphere was so damp and heavy, there was none to be seen. Coming back upon what I said about the excellence of the British troops at the end, that was perhaps a little piece of patriotic effusion on my own part which I think you will allow me—

The CHAIRMAN: Do not retract it.

Mr. SAUNDERS: All I want to say is that I like to indulge those feelings when I am living in Berlin, so that I hope nobody here will grudge me them. But what I said about the Emperor's opinion is perfectly true. I think if you enquire further into that matter you will find he was very much impressed at Aldershot, and he has said so again and again, because he never saw troops go by with a swing like ours; his own troops have a smart parade step, but they have not the swing and life our troops had in going past him. He was very much impressed with our cavalry too, I believe. I think you will find if you inquire further that that was the case. I only thought I would mention the fact (and it is a fact) to indulge my own feelings in the matter, not to damage the British Army in any way, by my humble praise, which you can afford to disregard. I am sorry that I am not able directly to answer Colonel Liddell's question. I have known a good number of Reserve cavalry Officers in Germany. I do not know about the men, or whether they are afterwards good for active service. I suppose Colonel Liddell meant to say that they deteriorate so much after leaving the army that it is of no use ever to call them out again.

Colonel LIDDELL: I meant that the rule is in the German Army that they do not take them back as cavalry soldiers; they put them on another list altogether. They use them for drivers, not for cavalry soldiers.

Mr. SAUNDERS: I am unable to answer that question myself, but I am grateful to our Chairman, who has undertaken to answer it for me. With regard to

smoke being a protection, I do not know, I am sure, whether the want of it would invariably preclude an advance across a glacis. I have seen such an attack as has been spoken of: it was only a very small sham fight. In that case the attacking troops did come right over the open with smokeless powder; but certainly they formed splendid targets; there is no doubt they were much more easily seen than if they had had the protection of smoke. I have been talking more of defensive positions in my paper, and, as I said in the summary, I did not speak on my own authority. I imagine that at the beginning of the next war the important thing will be to secure tactical positions, and to keep them; and therefore securing these positions will be very much more important than ever. I also said that cavalry will be very much more important in reconnoitring and finding out what positions the enemy is going to take up. The idea I have tried to convey is that it will only be at the very last stage of a battle that troops will ever venture into the open, when they have the new powder against them, even although they are firing the new powder themselves. With reference to the armoured turrets, I do not think I spoke quite so enthusiastically of them as Colonel Gunter indicated. I left the point undecided whether they were easily movable or not; but I think that a much more favourable description of them than mine was given by General Keith Fraser, and I must say that all my sources of information in Germany entirely confirm his views with regard to them. At the same time, I mentioned, I think, in the paper, that I certainly saw difficulties occur in transporting them. The ground was extremely difficult and hilly, and they were somewhat slowly transported; I should also like to know whether the turrets which General Keith Fraser referred to were smaller than those I saw. I do not think one horse, the strongest draught-horse, could have drawn one of the turrets I saw.

General KEITH FRASER: Those that I saw were drawn by two small country horses, but the turrets were not used as though in the field, at the manœuvres of which I spoke; they were only used for putting into earthworks thrown up rapidly, sending them down the morning or evening before taking up positions, not moving about the field. Therefore I never saw any difficulty in moving them, because there was always plenty of time to take them, shift them off the cart, and take away the horse. They were not used with field artillery.

Mr. SAUNDERS: I think they were used very much in the same way at these manœuvres. These entrenchments were put up in a single night, the wires I described and everything else; and the turrets were wheeled into position beforehand. The position was very carefully chosen. The men worked all night. As one gentleman said in speaking of the German soldier, he goes through a tremendous amount of work, and these men must have worked the whole night, and in drenching rain, in getting these positions into shape. With regard to the difficulty of transporting turrets for great distances, they would be transported by railway, and they can, of course, only be brought very effectively into position where there is some time to arrange the position beforehand. They cannot be carried all over the battlefield, hither and thither, and they were not so used in this case. They did not go forward with the advance or anything like that, but they strengthened the initial position of the Xth Corps. That is about all they did.

General Sir JAMES HILLS-JOHNES: With reference to range of vision, my difficulty was how they could be used in the attacking force.

Mr. SAUNDERS: They were not used in the attacking force at all on this occasion. I do not know that they could be. They might have been wheeled up to the top of a height opposite our positions, and have done something from there, but they would have been certainly lost in the retreat which the VIIth Corps had to make on that day, which became very precipitate. It was a regular scramble at the end of the battle. With regard to the conveyances the dogs were brought in, to the best of my recollection, we simply pressed into the service a lot of country carts and vehicles of that sort. The ground in the valley was not all broken up with hedges and ditches. In the place where the cavalry advanced there were fairly good roads, and the carts got over the fields all right. They certainly did that on that occasion. I do not know whether they could always be employed in this way.

The CHAIRMAN (Sir Beauchamp Walker): I do not think that, at this late hour

of the afternoon, you require much from me. I promised Mr. Saunders I would answer Colonel Liddell, not that I have anything to answer, because I entirely agree with him. If Colonel Russell, my successor at Berlin, were here, he would tell us what is the case at present. As well as I recollect, Colonel Liddell is quite right—the Reserve men are not put into the cavalry again, and there is really no necessity for it. At the time I served with the German Army the regiments of cavalry consisted of five squadrons. Four squadrons took the field, the fifth squadron remained at home, and was the next day raised to a strength of 200 men and horses, and was a Reserve for the regiment in the field. I was much amused by Mr. Saunders's description of the character given to the smokeless powder by the German General, because it was one of the points which I was most anxious to have brought out. At the time of the German manœuvres of last year I was, as usual, living with my daughter in Germany. The gardener at our house was called up to the very Xth Corps with which Mr. Saunders made such interesting experience, and when he came back, we naturally asked him, "What sort of a time have you had?" Oh, he had had a very hard time; very little to eat, and oh, that smokeless powder, it stank so that one could hardly stay in the ranks. I am sorry there is nobody here to-day who will tell us anything about the smokeless powder that we are introducing, and that the French and Austrians are introducing. I do not know whether General Keith Fraser can tell us anything about it.

General KEITH FRASER: It is all the same powder; it has the advantage of not smelling at all.

The CHAIRMAN: Certainly, from what I heard last year in Germany, the stench of this powder was something quite overpowering, and quite sufficient to be very hurtful. The last thing we hear about it is that camphor is being largely introduced into it, so there was a question the other day of the possible disappearance of camphor from the *materia medica*. There is one point no one has touched on. When I was asked to take the chair at this lecture, the point of most interest that crossed my mind was the question of the employment of large masses of cavalry. In 1866 the Prussians sent a cavalry Corps into the field. That was composed of two full Divisions of cavalry, and so little satisfied were they with the result attained by that cavalry Corps, that in the war of 1870–71 they had no tactical unit larger than the Division. I was really in hopes some other of my brother soldiers would have got up and discussed the question as to how large a mass of cavalry can with advantage be employed under one command. I quite agree with Mr. Saunders in what he told us he believed would be the result in Germany in the next war, of men being really laid hands on—I won't say whatever their rank, but certainly not by seniority—to take command of cavalry in the field, because it is about the most important duty the soldier has to perform, and the one that requires the sharpest fellow, hard rider, keen, cool head, and sharp eyes. In 1870–71 the Germans largely employed their cavalry in the very way indicated by Mr. Saunders. With the Army to which I refer, the Crown Prince's (late Emperor's Army), there were two Divisions constantly in the front, or on the flank, and it was from them that his Staff attained their knowledge of the French dispositions. In fact, the flank march, which ended in the Battle of Sedan, was entirely in consequence of the force of cavalry pushed forward, which got to Châlons and found out that Marshal MacMahon's Army had taken the march, and had so given an opportunity of his flank being fallen upon. Cavalry, therefore, were used in that way very largely indeed, and in other ways also. I know my old friends, the Brunswick Hussars, made a march which, without data before me, I should not like exactly to define, for the purpose of cutting a railway at a junction. I think they marched 35 miles, cut the railway, marched back again, and did it all within 36 hours. So much has been said by others that I have nothing really left to say, except to ask you to tender to Mr. Saunders our very warm thanks of acknowledgment for the most interesting lecture he has given us. It is very modest of him to say that he is a layman and civilian, and that it seems a very difficult matter. All I can say, I only wish he belonged to us. He showed a very marked appreciation of what he saw, and he has described it in simple, modest terms. We have not heard anything "of not getting anything to eat and nothing to drink." I think we are extremely indebted to him. There is another gentleman to whom I should like our thanks

to be given, and that is to Mr. Moore, the editor of the "Morning Post," and who has in the kindest manner assisted in our getting Mr. Saunders to come over to give this lecture. I think I may assume, from the applause with which you greeted my last words, that I am fully justified in thanking Mr. Saunders most cordially for the great pleasure and instruction he has given to us this afternoon.

Friday, June 20, 1890.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B., &c., &c., Adjutant-General to the Forces, in the Chair.

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## ON THE TRANSPORT OF TROOPS BY RAIL WITHIN THE UNITED KINGDOM.

By Lieutenant-Colonel GEORGE FINDLAY, Engineer and Railway Volunteer Staff Corps.

IN approaching the subject upon which I have undertaken to address you, there is one respect in which it will be necessary that I should claim your indulgence. Although I have the honour to hold the rank of a Lieutenant-Colonel in the Engineer and Railway Volunteer Staff Corps, I cannot, as, practically, a civilian, pretend to an intimate acquaintance with the technicalities of military organization, and I may, therefore, be led into errors, verbal or otherwise, which I can but ask you to overlook. I should like you to realize that I have addressed myself to this question from the point of view of a railway manager, bringing to bear upon it my experience of upwards of thirty-five years, much in the same way as that experience would be brought to bear upon any of the problems which frequently present themselves in the conduct of a large railway traffic at exceptionally busy times, that is to say, looking at it simply with a view to the adaptation of existing means and resources to a given end.

From the time when railways began to assume their present prominence as a potent factor in the life of the community in all European countries, it became evident that the invention of the locomotive steam engine must revolutionize the conditions of modern warfare very much as it had revolutionized everything else, and it came to be obviously a matter of the very first importance that the organization of military transport by railways in time of war should be carefully thought out and planned beforehand, so as to have everything prepared in the event of an emergency arising. No European State of any consequence has failed to grasp the importance of this question, and, briefly put, the problem they had to solve was this:—the railways of the country being such as they are, what are their relations to the State to be in time of peace and war, so far as regards their place in any scheme of national defence, and by whom, and under what conditions, should they be worked in time of actual war-

fare, so as to develop their resources to the utmost extent, and to secure uniformity of action and control, and so that the greatest amount of benefit may be derived from them in the carrying out of whatever operations may become necessary? The different European Governments have endeavoured to solve this problem in various ways.

In Germany, most of the railways being owned by the State, a central bureau has been established, assisted by four local bureaux, and by this means the entire rolling stock of the railways is regulated and controlled in time of peace and for ordinary commercial purposes, even the private railway companies being brought within the same system, and paid at a mileage rate for the use of their wagons. The effect of this would be in time of war to place the carriage and wagon stock of the country absolutely in the hands of the Government, together with the organized machinery for its control. A law passed in 1871 divides the railways into large groups or lines of communication for military purposes in time of war, and defines precisely the relations which are then to exist between the civil and military Officers who would have to carry out the transport arrangements, all the lines being placed at the disposal of the Army and worked by the staff of the Army for its own purposes. Periodical courses of practical instruction, held at the stations, and lasting two and a-half months, have been established, and are attended by Officers and non-commissioned officers of all arms, and those who have undergone this course of training would be detailed, in the event of mobilization, to take over the management of the railways.

In Austria-Hungary, in time of peace, the railways, both Government and private, are combined into groups, for each of which a central bureau or office controls the distribution of rolling stock, as in Germany, and keeps an account of its whereabouts. There is a convention, approved by law, between the War Office and the various railways, providing for their use in time of war, for the terms of user, and for the common utilization of wagon stock as required. What is termed a "Line Commission" is appointed for each main line or group of lines, consisting of a military General Officer and a railway man of some standing. They are called respectively the "Line Commandant" and the "Line Commissary." These "Line Commissions" are responsible to the central military organization for all transport arrangements in time of war.

In France, the plan of a central control of the common rolling stock in time of peace, as in Germany and Austria, has not yet been brought about, owing to difficulties which have arisen in dealing with the private railways, but the Government has power by law, in the event of mobilization, to take possession of the private railways at a specified rate of payment, and some of the railways are already State railways. A Military Commission exists, its President being the Chief of the Headquarters Staff, and this Commission would be charged with the superintendence of the rolling stock, and with all the arrangements for the transport of troops and stores. In time of peace there is a Special Committee for each of the seven railway

systems, viz., the six private railways and the Government railways, each such Committee comprising a military Staff Officer and a practical railway engineer, and these Committees in time of war would work the railways under the instructions of the Military Commission, while, if the operations extended beyond the frontier, they would assume, also, the control of the railways in the occupied territory.

In Italy, the military organization of the railways is very similar to that of France, but the railways belong to the Government, and are worked by two large companies, the distribution and control of the rolling stock of each company being in the hands of a central bureau. A civilian element also is introduced into the Military Commission in time of war by the fact of its including the managers of the two companies.

In the case of Switzerland, most of the principal railway companies have combined to place the control and distribution of their common rolling stock in the hands of a central bureau, which makes a daily distribution of the vehicles, and keeps accounts as between the companies, and this organization would be utilized in time of war to facilitate transport operations. There is, in time of peace, what is called the "Consulting Commission," composed of representatives of the railways, with the War Minister as President, and the duties of this Commission are very similar to those of the French "Military Commission." In time of war, a special "Central Direction" of five members is organized, and takes the place of the "Consulting Commission." This body receives instructions from the Chief of the Staff as to the transport required, and is responsible for carrying them out, and it, in fact, takes over the entire management and control of the Swiss railways, both for military and commercial purposes, for the time being. I am not very clear as to how this body is constituted, or whether the military or the civilian element prevails, but I think in all probability the "Central Direction" is really the "Consulting Commission" under a different title and with a new *status*.

This brief digest will be sufficient to show that all European Governments attach great importance to the question of railway transport, and have done their best to organize it; but in Great Britain, where the whole of the railways have been constructed by private enterprise, and where the number of Companies, great and small, is so large, it is obvious that the antecedent conditions differ so widely from those existing in most Continental States that any such arrangements as those which have been devised in Germany, Austria, France, or Italy would be inapplicable here. My view is that in time of war, when, in accordance with the provisions of the National Defence Act of 1888, the railway companies may be called upon by the Secretary of State for War to suspend, so far as may be necessary, the ordinary traffic, and to devote the railways, in priority, to military purposes, the principal railway officials should become, for the time being, the servants of the State, and the railways should be worked and controlled, under the direction of the Headquarters Staff, by the Officers of the Engineer and Railway Volunteer Staff Corps, who are the managers of the leading railway

companies; that is to say, that the Headquarters Staff would instruct them as to the transport required, and they would be responsible for providing it. The smaller railways should, for the time being, for all purposes connected with military transport, be affiliated to the other leading railways whose managers are Lieutenant-Colonels of the Railway Staff Corps, so that in fact all the railways of the country would be divided into a certain number of groups or sections, each of which would be under the direct management of an Officer of the Railway Staff Corps, these Officers in turn acting in conjunction with the Council of the Corps. Each Officer in charge of a group should be able to requisition stock, if required, from any of the other groups or sections; but this should be done through the medium of the Council, whose business it would be, with a full knowledge of the operations contemplated, and their extent, to regulate the distribution and supply of rolling stock throughout the area affected.

As to the payment ultimately to be made by the Companies for the use of rolling stock other than their own, the Railway Clearing House already provides complete machinery for keeping an account and arranging for payment as between one Company and another, on a system of mileage charges.

As regards the grouping of the lines into sections, I have gone into the details, but I do not think I need trouble you with them at any length. It will be sufficient for the purpose of illustration to say that one group would comprise the Great Eastern, Great Northern, and Manchester, Sheffield, and Lincolnshire Railways for transport on the East Coast between the Thames and the Humber. Another group would include the London and North Western Railway from London to Carlisle and Holyhead, the Great Western Railway from London to Chester, the North Staffordshire Railway, and a portion of the railways in Wales, and so on throughout the country. For each section there would be a Committee, composed of the General Managers of the lines included in the section, assisted by the principal engineers, locomotive engineers, passenger superintendents, and goods managers, the President of the Committee being the Lieutenant-Colonel of the Engineer and Railway Volunteer Staff Corps whose railway was included in the section. In the event of the transport requiring the co-operation of two or more sections of the railways, the Committees of such sections would act in unison, under the directions of the Council of the Railway Staff Corps. Routes, way-bills, and invoices would have to be sent with all troops and stores conveyed over the railways, with a view to a record being kept and the Companies being ultimately remunerated for the services performed.

As to the rules and regulations for the working of the lines, these are now uniform on all railways, and they would, of course, be the same in time of war as in time of peace.

An important provision would be to appoint for each section or group of railways a military Officer of rank, with power to arrange for the supply of food, forage, and water for the troops and horses *en route*, and this Officer should be also able to command the services of

the Royal or Volunteer Engineers to assist the ordinary railway staff in the erection of temporary platforms, landings, or sidings in emergencies when required. He should co-operate with and assist in every way in military matters the Committee of Section having charge of his district, but should not interfere with the working of the railways or the movement of the traffic.

I have outlined this scheme very briefly, and there are numerous details to be filled in, but in its general effect it has met with the approval of the Council of the Engineer and Railway Volunteer Staff Corps, who have been invited by the War Office to consider the whole question, and if ultimately adopted and elaborated as it might be, I believe it would represent the manner in which the perfect organization and ample appliances of the existing railways could be utilized to the greatest advantage for the benefit of the State in time of war.

In my view, this plan, which is somewhat akin to the one adopted in Switzerland, is greatly preferable to the system of organization which has found favour in France, Italy, and Germany, as the latter would have the effect of taking the actual working of the railways, at a period when the greatest strain was put upon them, out of the hands of the experienced officials who control them at ordinary times, and placing it in the hands of military Officers, whose only practical knowledge had been gained by occasional exercises and periods of training. It would, in fact, be very much like taking the command of a great ship from her experienced Captain during a storm and entrusting it to an amateur yachtsman!

The Continental States attach great importance to the possession of strategical lines of railway, both for purposes of attack and for the defence of the frontier; and an able writer in the "Times," treating of the military situation in Northern Europe, has recently shown the great advantage which has been gained by Germany and Austria-Hungary by the construction of such lines, as compared with Russia, who does not possess them to the same extent. He points out that there are no less than eleven German railways leading to the Russian frontier, while in Austria, there are six through lines of railway leading into Galicia; but Russia has no such railways as yet, and the result is that she is forced to maintain enormous masses of troops in her frontier provinces, at great distances from their homes, and from their base of supplies, because she cannot rely upon bringing them rapidly to the front upon the alarm being given. Happy the nation that has no frontier! England has none; or, rather, her frontier is the sea, and her first line of defence is the powerful Navy with which she patrols it. Her Government has no necessity to construct strategical railways, for private enterprise has already covered the country with a complete network of railways which would amply fulfil every requirement of any scheme of national defence.

Since railways first became an important factor in military operations, there have been in Europe but three opportunities of testing their value, and putting to the proof the arrangements made for working them under the strain of warlike operations. An able writer in the "Russian Military Magazin" (Colonel A. von Fendrikh),

has usefully summarized the lessons to be drawn from the Austro-Prussian War of 1866, the Franco-German War of 1870–71, and the Russo-Turkish War of 1877–78, and the result goes to show that, although, as might have been expected, the railways played an important part in the operations which were undertaken, and their use or abuse contributed largely to the results which were arrived at, many mistakes were made, and many failures have to be recorded which a wiser forethought might have avoided. In short, those who played the great game of war had, since they had last engaged in it, become possessed of a new and powerful weapon, but had not yet learned to use it with the dexterity which only comes of practice. Colonel Fendrikh's article has appeared in an English translation in the Journal of this Institution,[1] and it will not, therefore, be necessary for me to do more than just touch briefly upon its conclusions.

In the war of 1866, as we learn, although the general organization of the transport by the German railways was good, there was a great want of free communication between the higher military authorities and those charged with the management of the railways, the consequence being that trains were frequently run on slight occasions for the conveyance of small parties of men, or small quantities of stores, involving a great waste of resources. There was no controlling body having a complete grasp of the rolling stock of the country, and of the arrangements for the vehicles being well distributed, promptly unloaded, and returned empty to be used again, so that, at one time, there were nearly a thousand wagons standing under load in one part of the country, while in another there was a great dearth of rolling stock. This is one of the greatest mistakes that can be made. If wagons are restricted to mere conveyance, and unloaded promptly on arrival at their destination and returned, they can be used again and again, whereas if they are kept under load, they not only block up the sidings, which should be free for other purposes, but they are liable to fall into the hands of the enemy in the event of a reverse or a strategical retreat, and meanwhile they are altogether diverted from their legitimate use as vehicles of conveyance.

In 1870, when the German armies were launched upon the French frontier, the Germans showed that they had profited somewhat from the lessons of 1866, for the arrangements for railway transport were extremely methodical and worked fairly well. The entire German railway system was divided into nine main lines of communication for the concentration of troops towards the frontier—one of these being allotted to every two or three army corps. The Line Commissions, who were charged with the management of the transport, had each attached to them a special bureau for the control and distribution of the rolling stock, but still the mistake was made of having no *central* bureau having a grasp of the whole, so that each separate bureau worked—so to speak—for its own hand, and a certain loss of efficiency was the result. There was also still a want of sufficient promptitude in unloading and returning the wagons, and there proved

[1] Vol. xxxii, page 1003, *et seq.*

to be a great need for some supreme central administration of the transport of stores during the progress of the operations. Stores were handed over to the railways by the contractors indiscriminately, sometimes in less, and sometimes in greater, quantities than were required, and in the latter case the capacities of the receiving depôts were often overtaxed; the wagons could not be unloaded, and remained uselessly at the depôt, there being a want of temporary magazines in which to store the goods until they were required. The Germans, however, as practical people, soon learned the lessons of failure, and began to set their house in order. For instance, we learn that for the Ist and IInd Armies, quartered near Metz, trains of supplies, in large numbers, arrived at the station at Remilly, but, owing to the want of siding room at that station and others in the rear, and of magazines into which to unload the stores, something like a deadlock at one time resulted, there being upwards of 2,000 wagons containing supplies for these armies, under load. This had the effect of hampering the military operations all along the line to Sarbrücken; but soon a remedy was applied. Magazines were formed at several places, into which the wagons were unloaded, the empties returned, and the sidings cleared, and from that time forward a regular daily supply of food and forage was maintained for the whole Army of occupation. Here we have in a nutshell a great mistake and the remedy. It is obviously useless to despatch vast quantities of stores and munitions to the front without securing that at the point of arrival there shall be ample sidings to receive the wagons, magazines in which to store the goods until required for use, plenty of manual labour to unload them promptly, and adequate means of distributing them to the points where they are needed.

On the side of the French, although there was a complete system of railways directed upon the frontier, and a plentiful supply of rolling stock, and the railway companies displayed the greatest energy in carrying out the task laid upon them, their best efforts were frustrated by the want of a proper understanding between their officers and the military authorities, and between the Headquarters Staff and those who commanded at the front. Contradictory orders were given, countermanded, again given, and again countermanded, and the utmost confusion prevailed, the result being that for weeks, in the neighbourhood of Metz, not only all the sidings but the main lines and the lines leading to the locomotive sheds, were blocked up with loaded wagons, which ultimately fell into the hands of the Germans. Our author sums up the mistakes of the French in this campaign under so many different heads that I have not time to quote them all, but the most serious defects appear to have been the want of some special bureau of control on the lines of communication, which should have every day the accurate details for regulating the movement of troops and supplies, and of rolling stock, and the strained relations between the military element and the civilian railway staff throughout the campaign.

In the case of the Russo-Turkish War of 1877–78, it would appear from Colonel v. Fendrikh's account that no great advantage was

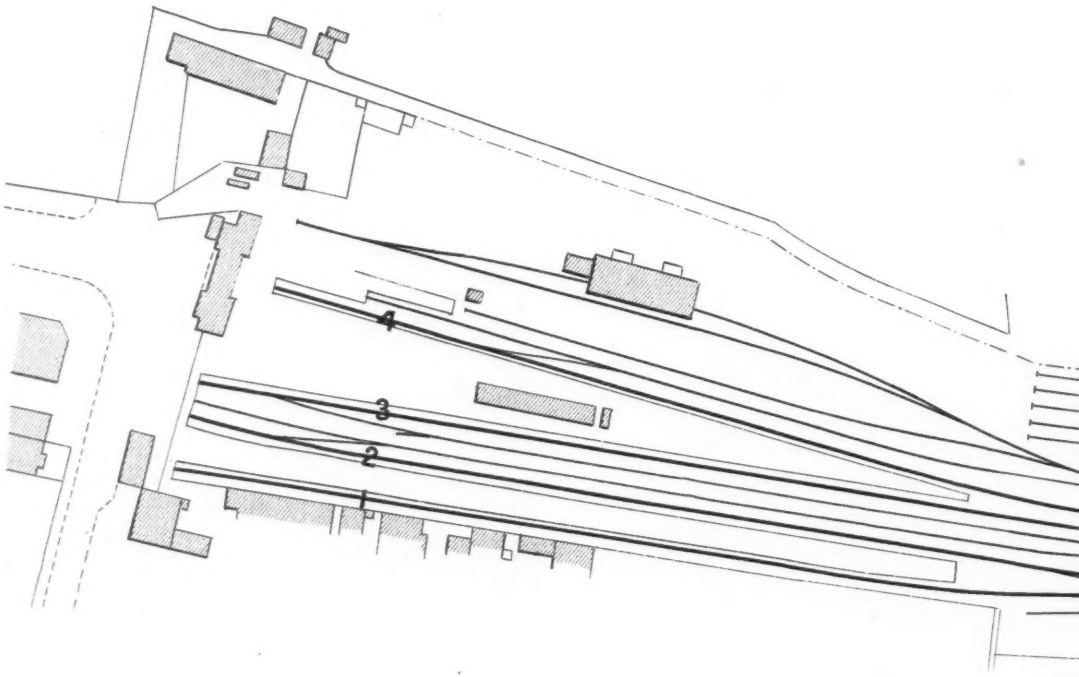
derived from railway transport, for in addition to the available lines being few in number, badly equipped in every respect, and poorly supplied with rolling stock, every mistake was made which it was possible to make, and as the result the greatest confusion prevailed, no proper organization of transport was attempted, and the military operations were greatly hampered in consequence.

These are valuable lessons for us in the art of "how not to do it," and it behoves us to take them to heart and profit as far as may be from the failures of others.

One good and sufficient reason for our seeking to derive what benefit we can from the experiences of other nations is that, happily for us, we have had no such experiences of our own, the most recent warlike operations in these islands having been conducted at a period long anterior to the introduction of railways. It is true that we have had from time to time to deal with Autumn Manœuvres and Volunteer Reviews, but there is hardly any comparison between such occasions as these and the emergency which would arise in the presence of actual warfare. The number of men engaged is comparatively small, and, as regards the Volunteers at any rate, they travel to and fro without much baggage or equipment, and are really almost as easily dealt with by the railway companies as an equal number of holiday excursionists.

What does really afford, however, some indication of what the English railway companies can accomplish in the way of dealing with large masses of people within a brief space of time is a glance at what is done by means of excursion trains on the occasion of the bank holidays, when the special facilities offered to the public by the companies tempt an immense number of people to flock from the large towns into the country, or from one town to another. For example, on the occasion of the last August bank holiday the London and North Western Company, alone, carried between various points within their system, on the two days, Saturday and Monday, 165,000 excursion passengers. The number of excursion, special, and relief trains run on the two days was 1,027, which were composed of about 10,500 vehicles. When you bear in mind that all this was done on only one of the railways of this country, while all the rest were equally well employed, and that it was all over and above the usual every day traffic, and was accomplished, so far as the North Western Company at any rate were concerned, without material interruption to the regular running of the ordinary passenger and goods trains, you will be prepared to realize that the resources of the English railway companies are very great, and that the task of transporting to the scene of operations the largest army which this country could put into the field, and keeping it supplied with provisions and munitions of war, is not one by which their powers would be unduly taxed.

Of course, I am perfectly well aware that to convey 165,000 excursionists is a very different undertaking to transporting an equal number of troops. The excursionists take with them little or no luggage, and all you have to do is to provide sufficient trains for their conveyance and to take proper measures to avoid confusion on the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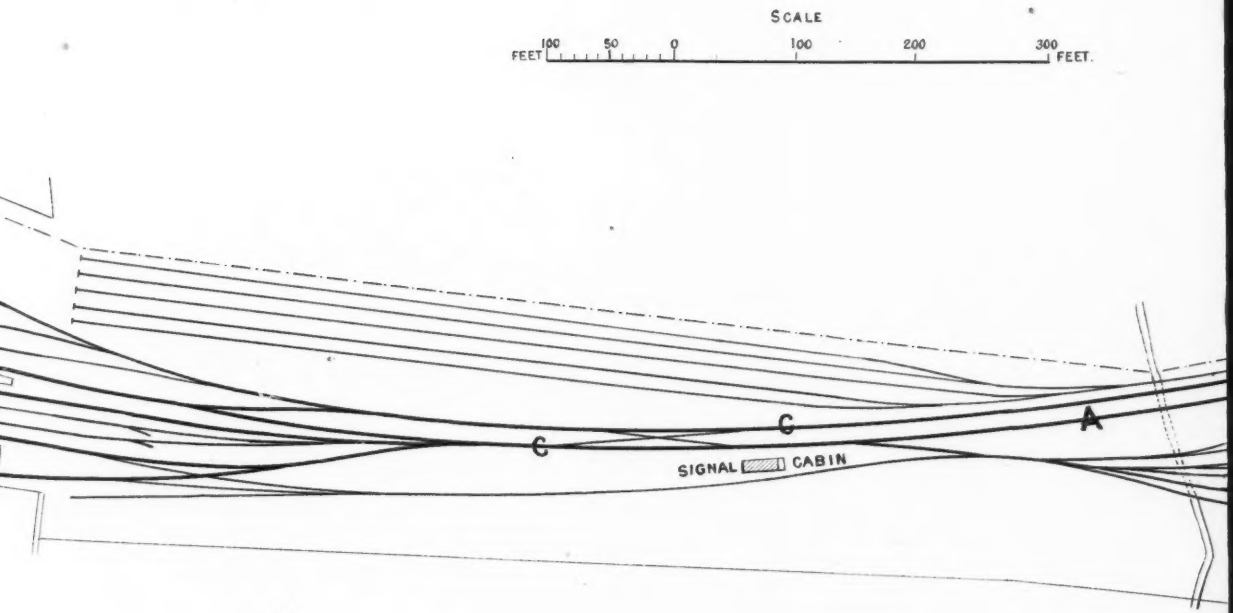


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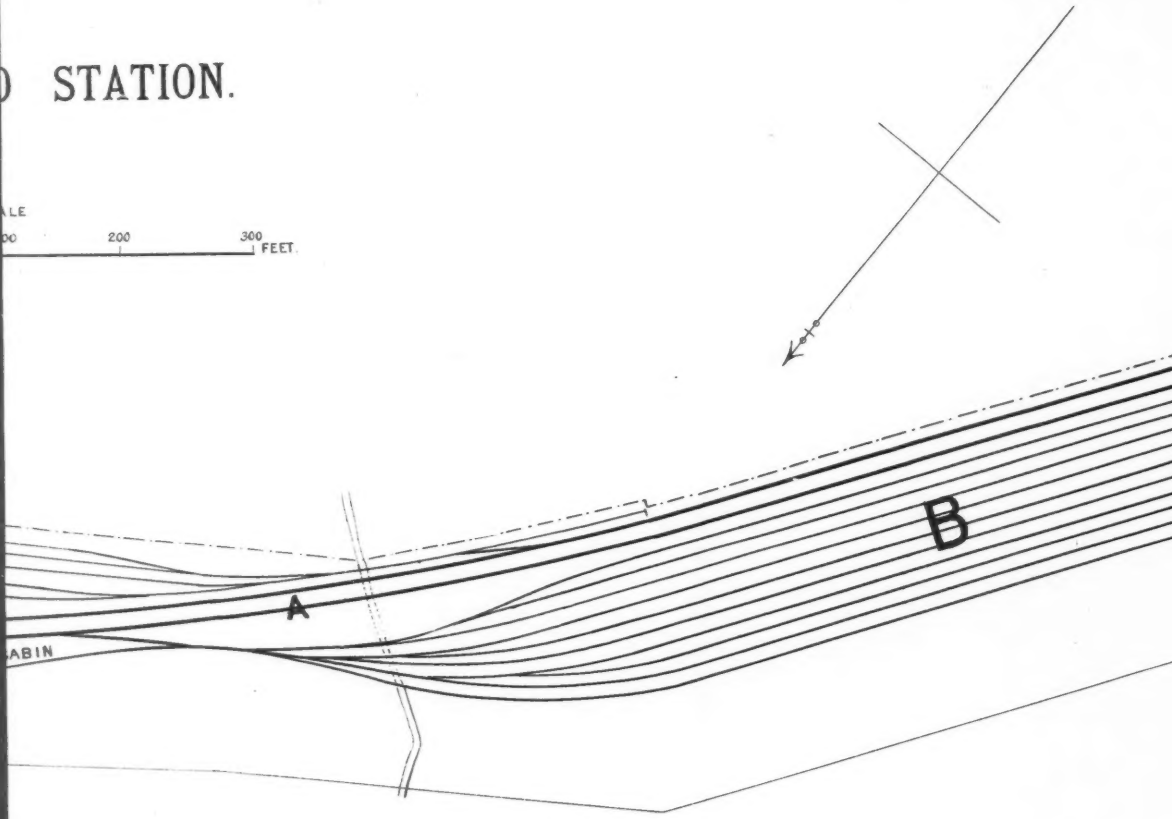

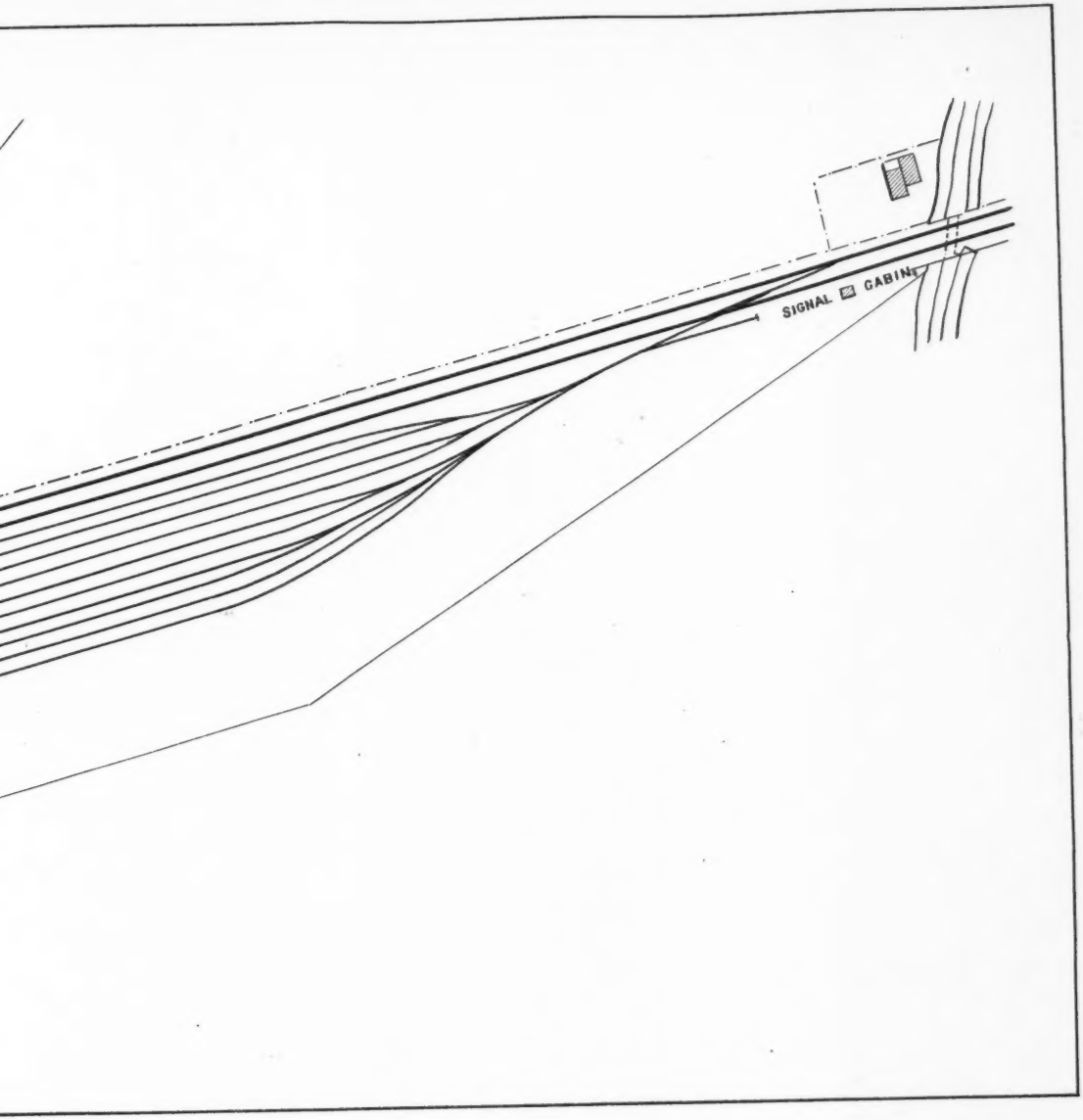
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platforms and at the booking offices. The troops, on the contrary, carry with them large quantities of baggage, horses, carriages, guns, and a host of other *impedimenta*, and all this must be provided for; but, on the other hand, it may be taken for granted that in an emergency there would be no hesitation in partially or wholly suspending the ordinary traffic, while, if necessary, the companies would co-operate one with another in carrying on the transport upon a given line of communication where two or more routes existed, so that there is little doubt that our railways as a whole would prove perfectly competent for any task that might be set them.

Of the great number of excursion passengers to whom I have referred very large bodies were directed upon certain points. For example, we carried to and from Llandudno, during the two days, including ordinary passengers, 21,000 people, the number of trains run being 182, composed of 1,822 vehicles. To and from Blackpool, a great and favourite resort of excursionists from the industrial centres of Lancashire and Yorkshire, the London and North Western and Lancashire and Yorkshire Companies carried on the same two days no less than 100,000 passengers, for whose conveyance upwards of 480 trains were employed, composed of nearly 6,000 vehicles.

Such an invading army as this can only be efficiently dealt with by means of ample accommodation, judiciously laid out, and the most perfect arrangements for working, otherwise the result would be a complete deadlock. You will observe, on the walls, diagrams showing the manner in which the stations and sidings at Blackpool and Llandudno are constructed, and it will not, perhaps, be out of place for me at this stage to give you some idea of the manner in which the accommodation is utilized, as this has a somewhat important bearing upon the question of detraining troops at the point of arrival (see Plate 12).

If you will look first at the diagram of Llandudno, you will observe that there are at that station four of the lines which we call platform lines or bays, that is, lines which run immediately alongside platforms, and these are numbered from 1 to 4. Two of these, Nos. 3 and 4, are reserved for the ordinary traffic, the other two, Nos. 1 and 2, being appropriated on busy days entirely to the excursion traffic. The trains, as they arrive, come in on the blue line marked A, and run either into No. 3 or No. 4 platform line, as the case may be, and as soon as the trains are empty the engines propel them backwards over the blue line into the large group of standing sidings which is marked B on the plan, where they stand for the rest of the day. These standing sidings, ten in number, are nearly two miles in aggregate length. We have no engine-shed at Llandudno itself, but we have a large one at Llandudno Junction, three miles away, and the engines therefore cross to the up main line through the points C, and run back to the junction, where they turn, take coal and water, and prepare for the return trip. When the time arrives for getting the excursionists away on their homeward journey, the engines run from the junction as far as the signal cabin, which is coloured red, at the south end of the excursion sidings, where each one is turned into the

siding in which its train is standing, and propels it forward to one of the platforms, and is ready to go away on the up main line as soon as the passengers have taken their seats.

A striking evidence of what great things can be accomplished in the way of transport within the space of a few hours will be within the experience of any one who has happened to be at the Great Northern Station at Doncaster, on the day of the St. Leger. On this great "day of days" to the good folks of Yorkshire, an immense concourse of people is directed upon Doncaster from all parts of the country, and by no less than six different railway routes, viz., those of the Great Northern, Manchester, Sheffield, and Lincolnshire, London and North Western, Lancashire and Yorkshire, Midland, and North-Eastern Companies, all these people being brought to Doncaster and taken back to their homes again within the space of a single long day of about eighteen hours. The Great Northern Company, who own the station, knowing the sort of deluge they have to expect, make their preparations accordingly. Doncaster being a great locomotive centre of theirs, they have there a large number of sidings, used ordinarily for locomotive purposes, in connection with the engine sheds and shops, and they have also a tolerably extensive goods yard. By six o'clock in the morning of the St. Leger day, all these sidings are cleared out, the goods traffic being, for the time being, suspended, and each siding is prominently numbered, certain groups of sidings being allotted to the trains of each Company. Soon after six o'clock, the long lines of excursion trains, many of which have started at midnight, begin to arrive, every train carrying on the engine a number corresponding to the number of one of the sidings, which has been set apart for its reception, and into which it runs. For such a mass of people, and for one day only, it would be all but impossible to provide platforms for the trains to run to, and, accordingly, the passengers alight without them, on the ballast, and make their way by a bridge across the station to the race ground. As for the trains, each one remains where it is during the day, but the engines get round the carriages by means of convenient crossings, turn on an engine turntable, take in fuel and water, and are placed in front of the trains ready to go away on the return journey. By and by, when the excursionists begin to troop back over the bridge, there is no need for confusion or bewilderment, or enquiries as to where the trains start from, for every excursionist knows the time his train leaves, knows its number, if he has taken the trouble to remember it, and knows also that he will find it exactly where he left it in the morning. The only drawback to all this is that he has to scramble into the train from the ballast as best he can, but race-going folks make little difficulty about this. Meanwhile, the station, with its platforms, waiting-rooms, and conveniences, is kept quite free from the excursion traffic, and the ordinary trains run to and fro as usual.

On the last St. Leger day, there were carried into and out of Doncaster, between morning and night, 99,000 passengers, who travelled in 216 trains, composed of nearly 2,500 vehicles, and yet I am assured by my Great Northern friends that this enormous number of people

were brought together and dispersed to their homes again with practically no confusion or delay, and with but little interruption to the ordinary traffic.

You will thus see that, with ample accommodation and a proper system of roads and sidings, laid out in such a way as exactly to provide for the operations required, the working of the largest traffic becomes a matter of the utmost simplicity, but with inadequate accommodation, or injudicious and ill-adapted arrangements, the wildest confusion is likely to arise, and this is the lesson which I think is to be drawn, for our present purpose, from the working of the excursion traffic. Give an experienced railway superintendent all that he asks for in the way of accommodation at both ends, and an ample staff, and he will face the biggest "rush" with perfect equanimity.

If you look at the diagrams of the two stations at Blackpool, you will see that, making allowance for the accidents of the ground, and their different situation, they are laid out in a very similar manner to the station at Llandudno, except that they are even greater in extent, and the working is, in principle, almost identical, so that I do not know that I need go into further detail with regard to it. All stations of this kind are designed on very much the same lines, the two great *desiderata* being ample platform-space, and long and roomy sidings in which the complete trains may stand during the day.

My object in describing the mode of laying out and working these stations is to impress upon you the fact that at the point of detrainment of troops, if accommodation of the description referred to did not already exist, it would be essential for it to be provided.

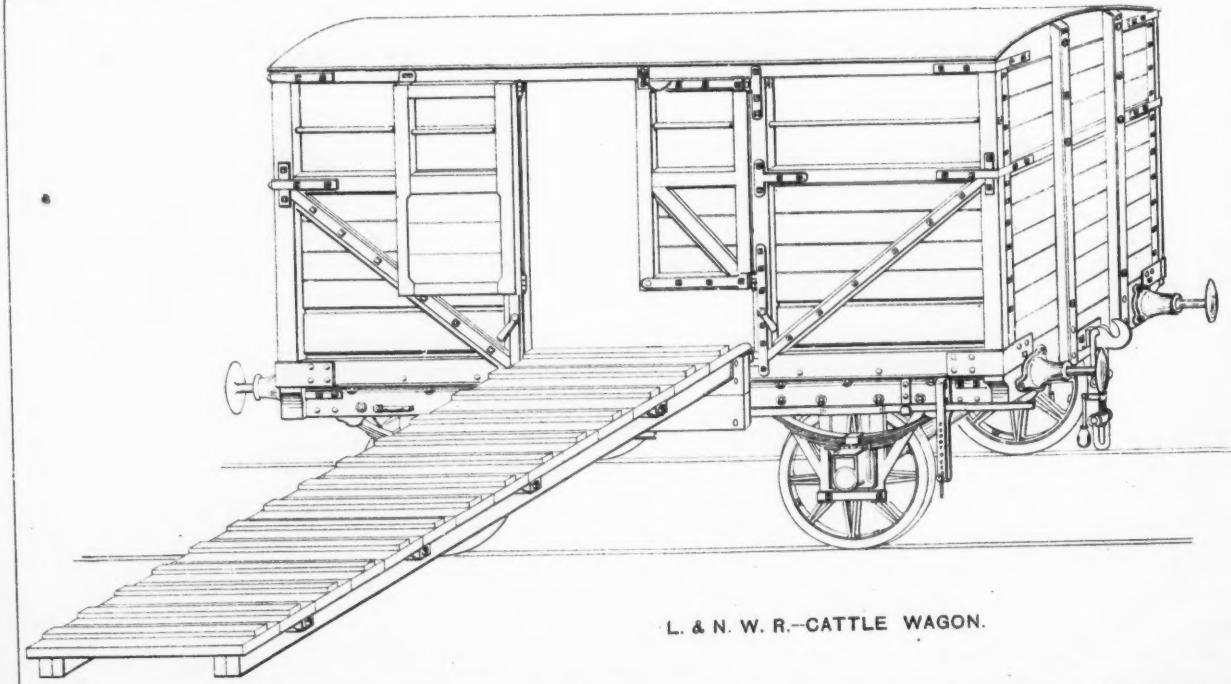
Now I am one of those who believe that in matters of this kind one good plain illustration is worth a great deal of vague generalization, and therefore I propose to show you what I, as a railway manager, after a careful study of the subject, believe would be the arrangements necessary to make in order to transport a body of troops, with all its matériel of war, to a given scene of operations by railway within the shortest possible space of time. I shall begin by asking you to suppose that a somewhat alarming state of things has arisen, that is, that a foreign invader has succeeded in baffling the vigilance of our Fleet, and has commenced to land, or is about to land, troops on the Essex coast, somewhere between Shoeburyness and Southend. Mr. Stanhope, in his speech on introducing the Army Estimates, in March last, foreshadowed what our present resources would enable us to do in such an emergency, and that by utilizing some battalions of Militia we should be in a position to immediately place in the field as our first line of defence about 110,000 men of all arms, divided into three complete Army Corps, leaving the Volunteer Army to occupy certain strong defensive positions as the second line of defence. I am going to assume that the three Army Corps, consisting of regular troops and Militia, have been mobilized, and that the object of the moment is to concentrate them with the least possible loss of time upon the line of Stanford-le-Hope and Chelmsford, occupying what I believe is known to military men as the

Basildon position; but for my present purpose I only intend to occupy myself with the movement of one of the three Army Corps, which I am going to assume has been mobilized at or near the military centre on Lichfield Common and Cannock Chase. Supposing now that I were called upon to undertake the task of transporting this particular Army Corps to the scene of operations; let me explain to you how I should set about it. In the first place, I should endeavour to avoid the common error of over-estimating even the greatest resources, and taking too sanguine a view of what could be accomplished by their means, than which nothing can be more fatal to success. If, for instance, I imagine that trains can be made up and despatched from a given point every twenty minutes, and it turns out in practice that they take half an hour to load, the result will be confusion and disaster, but if I assume that the trains can only be despatched once an hour, and it proves that they could be loaded in less than that time, the only effect would be that the scheme laid down would work with so much the greater smoothness. By all means, therefore, let us in all things under-estimate rather than over-estimate our resources.

In considering the problem I have set before me, the first point is to ascertain the limits of the task assigned to me; in other words, what does an Army Corps consist of? So far as I have been able to gather—and I am quite open to correction on matters of detail such as this—a complete English Army Corps, on a war footing, consists of 3 Divisions, or 21 battalions of infantry, with 3 regiments of divisional cavalry, 9 batteries of divisional field artillery, 3 companies of Royal Engineers, 3 reserve ammunition columns, 3 companies of the Commissariat Transport Corps, and other miscellaneous details, together with the Divisional Staff. But, in addition, there will be the general Staff of the Army Corps, with a brigade of cavalry (3 regiments), 3 batteries of Royal Horse Artillery, 2 field batteries, a corps of Royal Engineers, and 2½ companies of the Commissariat Transport Corps.

To sum up all this, and to drop, for my purpose, the technical distinction between the divisional cavalry and artillery and the troops of those and other arms attached to the Army Corps, I find that what I have to deal with is as follows:—

21 Battalions of infantry.
6 Regiments of cavalry.
11 Batteries of field artillery.
3 Batteries of horse artillery.
4 Companies of Royal Engineers with pontoon troop and telegraph battalion.
6½ Companies of Commissariat Transport Corps.
7 Field hospitals.
1 Bearer company.
Military police.
Postal and Veterinary Departments.



L. & N. W. R.—CATTLE WAGON.

Harrison & Sons, Lith. St. Martins Lane, W.C.

The whole comprising—

33,292 Non-commissioned officers, rank and file, drivers, servants, &c.
1,234 Commissioned Officers.
12,934 Horses and mules of all kinds.
1,362 Wheeled vehicles, exclusive of gun carriages.
90 Guns.

With, of course, a large quantity of personal baggage and other *impedimenta*.

If you look at a railway map, you will see that the natural route from Lichfield to the imaginary scene of operations is over the Trent Valley Railway to Rugby, thence viâ Market Harborough to Peterborough, and from there over the Great Eastern line by way of Cambridge. With a view as nearly as possible to give a clear run for the troop trains, without interruption from the ordinary traffic (supposing that the emergency was not yet so great as to necessitate the entire suspension of the latter), I should devote the Trent Valley Railway between Lichfield and Rugby and the branch between Rugby and Peterborough exclusively to military purposes, working all the ordinary trains from north to south, and *vice versâ*, round by way of Coventry and Birmingham, while for Peterborough they would have to go round by way of Northampton.

I should use for entraining the troops two stations, Lichfield and Tamworth, loading the infantry, as far as possible, from one station, and the cavalry and artillery and military train from the other, so as to keep these separate and avoid confusion. Both the stations are of fair size and not deficient in accommodation for ordinary purposes; but probably, to enable them to meet such a strain as would be put upon them, it would be necessary to supplement the permanent accommodation by erecting temporary platforms and laying down temporary sidings, such as could easily be constructed in a few hours. I believe I am right in saying that the troops themselves can entrain and detrain, if need be, without platforms, and it is well known to those who are experienced in such matters that in the absence of regular loading banks, guns and baggage wagons can be loaded by means of ramps or inclined planes, which can be improvised in a very short time and carried with the trains for use when required, but for loading horses there must be proper landings or loading banks, and these would be constructed with ballast and old sleepers in a few hours. Horses could, however, be unloaded, and even loaded in an emergency, by means of portable ramps or landings, such as are used by railway companies for dealing with cattle at stations where there are no proper cattle landings; and I have here a diagram which shows one of these portable landings, and the manner in which it would be placed in position and made use of (see Plate 13).

While upon the subject of the loading of horses, I may observe that a suggestion has more than once been made that the cattle-trucks used for this purpose should have the ends made to let down, so that the portion of the train composed of these trucks would form

a continuous platform, the horses being walked from the end of the train to the most forward truck. When the first truck was full, the end would be raised to its proper position, and the second truck would be filled in like manner, and so on, the same principle being suggested for the loading of wheeled vehicles. I should like to say with regard to this, that I do not believe the method suggested to be a practicable one, and, in any case, it could not be adopted unless the entire stock of cattle-trucks and carriage-trucks throughout the country were altered as to their mode of construction, since no English railway company, so far as I am aware, constructs its vehicles in this fashion.

I may mention that at the City Station at Lichfield the London and North Western Company have an important goods station, with every convenience for dealing with a large traffic, and no doubt a great deal of the heavy baggage and camp equipment, such as would not necessarily be carried actually with the troops, as well as stores and ammunition, would be despatched from the station in the same way as ordinary traffic in time of peace.

The chief superintendent of the line, with his principal assistant, would be present, and direct the operations in person, and an ample staff of inspectors, foremen, porters, shunters, guards, and others would be concentrated upon the spot. The two stations, Lichfield and Tamworth, would be connected by telephone or telegraph with each other, and with the points of detrainment at the other end, and it would be probably advantageous for a similar communication to be established between all the stations concerned in the operation and the Headquarters Staff.

I should assemble, by the use of the telegraph, an ample supply of rolling stock of all descriptions in the rear, at Stafford and Crewe, and, in the extensive sorting sidings which exist at those places, all the trains would be marshalled and made up and forwarded to Lichfield and Tamworth as required, care being taken not to block up those stations with empty trains before they were wanted, but at the same time always keeping one or two in reserve, so as to guard against any momentary hitch in the arrangements for supplying them.

I should make up long trains, consisting of from twenty-five to thirty vehicles, and run them at a moderate rate of speed, say twenty-five miles an hour, including two or three necessary stoppages on the way, and to haul such heavy weights, at even so low a rate of speed, I should deem it best to employ our largest and most powerful type of goods or coal engine. My principal object in running such heavy trains would be to preserve the tactical units complete as far as possible, as I can easily imagine that if this were done, it would save a vast amount of confusion and delay. For instance, it is not possible to carry an entire battalion of infantry with all its baggage, horses, and vehicles, by one train, but I should take each battalion by two trains, making the two follow each other at a short interval, say of fifteen minutes, so that, practically, they would arrive at their destination together, could be detrained as a whole, and march away

from the station to their camping-ground with all their belongings as a complete battalion.

In the same way I should carry each battery of artillery by two trains following each other at the same interval, but the cavalry would be less easy to deal with, as, according to my computation, each regiment would require more than four trains, that is two regiments would occupy about nine trains, and all that could be done would be to proceed methodically, that is to complete the sending away of one entire regiment before commencing on a second. Of course the military authorities would assist in this, and in the avoidance of confusion and overcrowding, by marching the troops to the points of entrainment, in proper order, and not before the trains were ready for them, the latter being a point of great importance.

The necessity for long trains being admitted, the low rate of speed becomes imperative, and it is equally obvious that the most powerful type of engine must be employed.

Another point to be borne in mind is that each engine must carry with it a sufficient supply of coal to last it on the return, as well as the outward, journey, as there will probably be no facilities for re-coaling at the other end. It would be best for the same engines and engine-drivers to work the trains throughout, the Great Eastern Company providing pilotmen to join the trains at Peterborough, as the North Western drivers would not be familiar with the lines and signals.

I believe we should be able to place about forty men in each vehicle as an average, but every vehicle should be conspicuously lettered to show the number of men who should occupy each compartment, so as to avoid confusion. We should use third class carriages as far as possible, but failing these, we should fall back upon second class carriages or what we call composites, and seeing that the men would take with them into the carriages their kits and accoutrements, forty men per vehicle is probably as many as we could reckon on. The Officers' chargers would travel in horse-boxes, but the troop-horses and baggage animals would be loaded in covered cattle-trucks, about six or seven in a truck, each animal being secured by the head, and the ends of the wagons being protected with sheets. The guns and baggage-wagons and other vehicles would be carried on low-sided carriage-trucks.

So far as I can judge from a very careful calculation, I believe that the entire Army Corps, with its complete equipment, could be carried in about 150 trains such as I have described, and I should not feel justified in assuming that these trains could be despatched at one end or received and liberated at the other end at less intervals than one hour for each train, except that, as I have said, in the case of infantry, two trains would depart each hour, following each other at a short interval of, say, fifteen minutes. This calculation, of course, only represents an average, for I am told by those who have had experience in such matters, that while half a battalion of infantry can be entrained in about twenty minutes, a train of cavalry, owing to the restiveness and nervousness of the horses, would sometimes occupy considerably over an hour.

With the block telegraph system in operation there is no difficulty in passing trains over a railway at intervals of five or ten minutes; but the measure of the capacity of the line is of course the rate at which the trains can be got ready and despatched at one end, and unloaded and released at the other end; and I shall, therefore, only assume that by using two stations at each end, and working both by night and day, we should succeed in transporting the whole body to the scene of operations within seventy-two hours, or, roughly speaking, within three days; that is to say that—the distance being about 186 miles—the first train would arrive in eight hours, and the remainder at the rate of two per hour—one at each station—or, in the case of infantry, four per hour, or two at each station. Of course I am assuming that the railway companies, by utilizing all the resources at their command and by employing a system of reliefs with regard to the staff, would have no difficulty in carrying on the operations continuously, both by day and night, until the whole task was accomplished.

In a journey of this length probably two stoppages would be required, one of which would be of sufficient duration to enable the troops to be supplied with food and the horses with forage and water. The trains should not all stop at the same places, but should be alternated so as not to overtax the resources provided at any one point of stoppage; for instance, if the first train made its principal stoppage at Market Harborough, the second would make it at Peterborough, and so on. I take it that the arrangements at these stopping places would be undertaken by the military Officer who I have suggested should be appointed for each group or district of railways to attend to the wants of the troops and horses in the matter of food, forage, and water *en route*, and I presume he would have at his command a staff of helpers and all the necessary appliances.

But now, supposing that all the arrangements for entraining the troops are matured and work smoothly, and that the trains safely reach their destination at the hours appointed, we approach the most difficult part of the problem—and yet the one upon which most depends. At such stations as exist at or near the assumed scene of operations, it is not to be expected that permanent sidings, platforms, landings, and other accommodation of the character required to conduct such extensive operations would be found existing, and it would be necessary to supply the deficiencies by works of a temporary nature, but carefully planned, so as to meet all the requirements of the business in hand.

It will not be forgotten that I have supposed three Army Corps to be making their way simultaneously to the proposed line of defence, while I have only been concerning myself with the movements of one; but it would be a matter of the first importance to fix upon different stations for the detrainment of the three Army Corps, as any attempt to concentrate them all at one or two stations could only result in a complete dead-lock. I should therefore propose to appropriate Brentwood and Chelmsford stations for the detrainment of the Army Corps coming from Lichfield, leaving a second, which would probably

be coming from the direction of Aldershot, to be dealt with at the various stations on the Tilbury and Southend Railway, and the third, coming probably by the East Coast lines, at some other Great Eastern Stations in the district, such as Ingatestone and Shenfield. As regards what, by this time, I shall be justified in calling *our* Army Corps, I should endeavour to preserve the same distinction as at the point of entrainment, appropriating one of the two stations to cavalry and artillery, and the other, as far as possible, to infantry. The same class of superior officials and the same ample staff of foremen, porters, shunters, &c., would be required as at the point of departure; but the first and most important step to be taken would be at the very outset to despatch to the places of detrainment a staff of platelayers, artisans, and labourers, with an ample supply of rails, sleepers, points, and crossings and other materials, so that they might, as quickly as possible, and working night and day, provide all that was necessary in the way of temporary landings and platforms for unloading guns, baggage, stores, and horses, and sidings into which the numerous trains might run, with convenient crossings to enable the engines to run round the carriages and draw out the empty trains for the return journey. Sufficient siding room should also be provided for standing a certain number of empty trains in the vicinity, which should be kept on hand in the event of their being required for the conveyance of the sick and wounded to the rear. Another important requirement would be to establish at a convenient point on the railway, near the camp, a large temporary goods station, with unloading banks, sidings, steam cranes, and cart approaches, so as to deal in the most convenient manner with the supplies of goods, ammunition, and stores, which would be daily coming to the front so long as the Army was in the field. Probably for this purpose there would be nothing more suitable than the temporary arrangements which it is customary for the railway companies to make in connection with the meetings of the Royal Agricultural Society from year to year.

It would also be necessary for the engineers to make sure of an adequate supply of water for the locomotives and for other purposes; and, if this did not already exist, it would be absolutely essential to meet the deficiency by running a temporary service from the nearest available source.

All the sidings, landings, and other conveniences should be located, not, perhaps, necessarily actually at the stations I have named, but as near to them as possible, and on level ground adjoining the railway, so as to avoid extensive earthworks, and thus minimize the labour and loss of time. For carrying on the work during the hours of darkness it would be found advantageous to use the "Wells" light—a patent, by means of which a powerful light is obtained from crude petroleum or shale oil. This is commonly used now by railway and other contractors for carrying on their works during the night.

On the arrival of a troop train at the point of detrainment, the energies of all concerned would at once be concentrated upon the purpose of unloading the horses, baggage wagons, &c., with the least

possible loss of time, and the troops should be formed up and marched off the ground as quickly as possible, so as to leave the way clear for the arrival of the next train. The engine would meanwhile have taken in fuel and water, and got round the train so as to be ready to start back with it as soon as it was empty.

If I have made my meaning clear, you will have gathered that the difficulties I most fear are those connected with the deficiency of permanent accommodation at the points of detrainment, but, I believe, that by the display of energy and determination on the part of all concerned, and by the lavish use of the large resources which we should undoubtedly have at our command, these difficulties would be overcome, and we should succeed in accomplishing our task with promptitude and efficiency.

I have thus attempted, very briefly, and I fear very imperfectly, to give you a mere outline sketch of what I conceive would be the proper way in which to carry out such an operation as that I have contemplated. As it stands, it is of course a mere skeleton, and numberless details would require to be considered and filled in—difficulties, some of them quite unforeseen, would doubtless crop up from time to time, and would have to be met and overcome as they arose; but what I have said will perhaps suffice to indicate the magnitude of the task which would have to be undertaken, and the careful and methodical arrangements which would be necessary in order to avoid confusion and disaster. I hope, too, I have succeeded in convincing you that it would be an act of worse than folly, at such a crisis, to dream of taking the management of the railways out of the hands of the skilled experts who have passed their lives amidst the practical working of them, and placing it even partially under the control of military men, who, at best, can only possess a theoretical knowledge of the subject. I have tried to make what I have said more clearly intelligible by localizing the operations and assuming a certain state of things; but you will, of course, understand that what I have laid down as being necessary for the transport of an army corps from Lichfield to Chelmsford would be equally applicable to the movement of a similar body of troops from one point to another anywhere within Great Britain.

Before leaving my subject, I should like to say that it is very much a matter of regret to me that the operations of entraining and detraining troops, horses, and guns are so unfamiliar as they are to the British soldier. These, like every other kind of operation, can be carried out in two ways—quickly and expertly, or slowly and clumsily —and the difference must be entirely a matter of practice. It is, in short, a form of drill in itself, which our troops get little or no opportunity of practising. Of course the reason is not far to seek;—at the present rates which the railway companies are authorized to charge for the conveyance of troops and their baggage, the War Office find it cheaper to effect the transport of troops from one part of the country to the other by sea, wherever it is practicable, and this has become so much the practice, that even the Guards, who are sent annually, in turn, to perform garrison duty in Dublin, are sent by sea

round the Land's End, rather than by rail *viâ* Holyhead, although, in this case, the saving, if any, must be very small indeed. In 1883, Mr. Childers, who was then Chancellor of the Exchequer, negotiated a sort of compromise with the railway companies, which was embodied in what is called the Cheap Trains Act. The effect of this was that, in consideration of certain very partial remissions of the Passenger Duty, the companies became bound to carry Her Majesty's troops, in any numbers up to 150, at three-fourths of the ordinary passenger fares; or if the number exceeded 150 men, at three-fourths of the ordinary fare for the first 150, and half the ordinary fare for the remainder, and to convey military baggage, stores, and ammunition at twopence per ton per mile. But at these rates it is not worth the while of the Government to take the troops by rail instead of by sea, and, moreover, there is no provision for any exceptional rates for the conveyance of cavalry horses, baggage wagons, or guns, and I cannot help thinking it was a pity that Mr. Childers, while he was about it, did not go a little further, and make such terms with the companies as would have resulted in the troops of all arms being transported by rail instead of coastwise by sea. They would thus travel with greater speed and comfort, and would acquire practice in the operations of railway transport, which would be turned to valuable account if such an emergency as that which I have imagined should ever arise. I have no authority to speak for any company, or to do more than express my individual opinion; but I believe that if, some day, when the Secretary of State for War finds a Chancellor of the Exchequer with a surplus to dispose of, he should turn his attention to completing what Mr. Childers left undone, he would not find the railway companies unwilling to deal with the matter in a reasonable spirit.

Major-General Sir Redvers H. Buller, V.C., K.C.B., Quartermaster-General to the Forces: I must say that the part of the paper that it was the greatest pleasure to me to hear was the peroration, for to no one more than myself can it be a greater delight to hear that there is some chance of our being able to send troops about by rail. It is fair to say, though, that Mr. Childers made the best bargain in 1883 that the railway companies would allow him to make. It is a very odd thing to us soldiers, that whenever troops have to be moved the railway companies take the uttermost penny, whereas they are quite ready when moving Volunteers to treat them as excursionists, and move them at a fairly remunerative rate. It would be a very great advantage to the Army if railway managers would combine to see this matter in the, I may say, patriotic and liberal spirit in which, as I hope I may judge from these remarks, Mr. Findlay is already beginning to appreciate it. So difficult do we find it to practise troops in entraining and detraining, that despairing of ever getting better terms from the railway companies, we are now building a line at Aldershot on our own ground, on which we hope to practise our troops. I think I may point to that as a proof that we are at present alive to the immense advantages of having a well-understood and complete drill for entraining and detraining, but that the difficulties we have suffered hitherto have been rather the creation of others than our own. In the admirable scheme given by the lecturer for the concentration of an Army Corps, I was struck by the length of time that he allowed for detraining. I have always imagined myself that, whatever the previous difficulties might be, when once you get a train to a station at which you have made moderately good provision for getting horses, guns, and wagons out of the train, the act of detraining should not present great difficulties, and would probably be considerably more rapid than that

of entraining. I imagine that in any actual operations in England, movements by rail would probably be movements of concentration rather than the removal of concentrated troops from one particular spot, and so we should be enabled to entrain our troops at a large number of stations, though detraining them at comparatively few stations. This point is then one of some importance, and I should very much like to hear what the lecturer's experience is with regard to getting people out of a train. There also comes in the question of brows or the means of making temporary platforms. It is rather hinted at by the lecturer that there are such things in existence, but I can speak for certain of one of the large railways that we most employ, that they have nothing at all that would be of any use. I have always calculated that in any military operations in which railways were largely used, new platform arrangements or brows would have to be constructed beforehand, and that no portable ones that could be got at at short notice exist. I do not know whether there are any on the northern lines, but I think on the southern lines none exist; and, as the lecturer has forcibly pointed out, proper station accommodation must be prepared beforehand if any concentration by railway is to be successful. There is one point which is not mentioned in the lecture, it is one, I think, to which, if we had ever to operate in England, we should have to attach considerable importance, and that is, what is the minimum distance over which it would pay us to move troops by rail; allowing for the time necessarily taken up in entraining and detraining, and the time taken by the railway journey, minimum distance for which we should be justified in using a railway rather than the natural transport of the men? That, I think, in any operations in England is a point that we ought to know something about, and on which at present we have no real data to proceed at all. I have to thank Mr. Findlay for airing this question. It is a great advantage to have it discussed. I know officially what an immense help to the Quartermaster-General's Department the Railway and Engineer Volunteer Staff Corps have always been. They have once or twice worked out for us very considerable schemes most admirably, and I think we are going very shortly to show our gratitude by giving them a still larger and still more comprehensive one to work out.

Colonel FRASER, C.M.G., R.E.: Considering the number of gentlemen present interested in the subject, civilians as well as soldiers, I may mention that the details which Colonel Findlay has so kindly and so ably put before us are practically worked out in the military text-books on the subject, and particularly in the "Soldier's Pocket Book," which owes its authorship to the Chairman. Those of you who have not had occasion or necessity to refer to that book may be glad of an opportunity of turning to it and seeing how these problems have been already practically worked out for the Army, and it will give you some additional facts that bear on the subject.

Lieutenant-Colonel SCOTTER, Engineer and Railway Volunteer Staff Corps (L. & S. W. Railway): I am very sorry that my friend Mr. Findlay whispered my name to Lord Wolseley, because I am rather taken by surprise. I came here to listen to what I hoped would be a very interesting discussion on the very admirable paper that has been read by Mr. Findlay, but as you have been kind enough to call upon me, I may say that, although I agree generally with the remarks made by Mr. Findlay in his paper, I also quite agree with Sir Redvers Buller that Mr. Findlay, with a desire not to over-estimate the time, has considerably under-estimated what can be done by the resources of the railways of this country. I am quite sure, in fact I may say that I have worked it out this morning, that the same Army Corps that Mr. Findlay dealt with as going from Lichfield to the Eastern Counties, instead of occupying three days, leaving the enemy the opportunity of those three days to play about, could have easily been worked in twenty-four hours. Also that in case of emergency it is of the utmost importance, at any rate, that the troops should not be moved by slow trains, but by quick trains. I am not going to point out how this can be done, but I will mention one thing which will show you how, at any rate without altering the scheme of Mr. Findlay at all, it could be done in a day and a half instead of three days. In the first place, Mr. Findlay has told you he should propose to utilize the whole of the railway between Lichfield and Peterborough, and to use it entirely for military purposes. Such being the case, I should like to know why the trains could not be run upon the two lines in-

stead of upon one line only, and if two lines are utilized, only half the time suggested by Mr. Findlay need be occupied in moving an Army Corps to the Eastern Counties. I know that there are little difficulties attending this, but it is a common practice amongst all railway companies. In the case of a break down or accident what is more common, what is more easily done, than to divert the whole of the traffic, both up and down, on to one line? Therefore, in case of a crisis of this kind, when the country is invaded, I think that the arrangements which we make every day, in case of accident, of using the up line for down traffic and *vice versâ*, should be brought into use, and the two lines utilized for the transport of an Army Corps with the least possible delay. There is another point I should mention in connection with this lecture, but perhaps I may take the opportunity of putting it in writing, and I could put it more clearly in writing than I could express myself in this distinguished company. But I may say this, that with regard to the point raised as to the accommodation for detraining troops of all kinds, I am sure Mr. Findlay will agree with me when I say, and in fact I think it was stated in his paper, that there is not the slightest difficulty in detraining all the troops upon the ballast; soldiers can easily get out of the train on the ballast. In such a case the station platform would be available for the horses and baggage and artillery, and although railway companies have not many opportunities of testing and showing what they can do, I, representing a company somewhat largely interested in the carriage of troops, am enabled to say with authority that the time allowed by my friend is altogether beyond the actual time occupied. There is not the slightest difficulty in entraining in ten minutes; there is not the slightest difficulty in detraining in the same time, or rather less than more. In regard to cavalry, the only experience that perhaps any railway company in this country has had of carrying a cavalry regiment from one part of the country to the other, at least the only one that I know of, was in connection with the South Western Railway, when a proper record was kept, and is in existence now, of the actual time occupied in entraining a regiment of cavalry, and we found it took thirty minutes. Therefore the time my friend allowed of one hour is, I admit, more than ample, but I do not for a moment question his judgment in rather under-estimating than over-estimating it. I may, perhaps, allude to the other question raised by Sir Redvers Buller. Of course, as Mr. Findlay says in his paper, he has not had the opportunity of discussing with other companies the question of the conveyance of troops by railway, but the general question has often been discussed by railway companies, and I do not think the present moment is an inopportune one for raising the question again. I believe the railway companies would meet that question, as they meet all questions of great national importance like this, in a fair and liberal spirit, and I think, perhaps, it would be found that the terms would be altogether favourable to the War Office.

Lieutenant-Colonel FINDLAY, in reply: I have very little to answer to those who have been good enough to criticize what I have had the honour to read to you in the shape of my lecture. In answer to what the Quartermaster-General said, I quite agree with him that, on the question of detraining, the troops could be detrained more quickly than they could be entrained, but for the purpose of the paper, you will observe, I assumed the concentration of troops at a particular point, going to a given destination, and in that case there is no doubt that the detraining must of necessity occupy the same time as the entraining, because, with the same number of trains going over the same distance to the same destination, you cannot increase the number of trains; therefore the time occupied in despatching the trains would be the time occupied in receiving them, and it would be of no use for your troops to get out of the train at one end more quickly than they got in at the other. That is a perfectly logical conclusion, I think, although I see the Quartermaster-General shaking his head. If troops were concentrated on the same point, but started from several points, I readily admit that the time taken in detraining may be much less than in entraining troops. Upon the question of loading and unloading horses, instead of having embankments and landings, and things of that kind, I believe it has been the case, in France at least, where all their covered wagons are marked to contain thirty-two men or eight horses, all those wagons are fitted with appliances such as I have sketched upon the wall, by which both men and horses can be walked up into the wagon, or out of the wagon, without

using any embankments or landings, or things of that kind. Then the Quarter-master-General cannot resist his economical tendencies even in time of war, for he says, "What is the minimum distance for which it would pay us to use the railway?"

Sir REDVERS BULLER: I was speaking with regard to economy of time, not of money.

Lieutenant-Colonel FINDLAY: If it is a question of economy of time, I was going on to say, no doubt with cavalry starting from a given point, supposing them to go as part of an Army Corps with infantry, it would be possible for them to march a considerable distance ahead, and with advantage. In fact, if my statistics are right, although my friend Mr. Scotter says they are not quite so as to the point of time, in the three days some regiments of cavalry would get on at least half the distance towards Chelmsford if they all started from Lichfield, so that there would be some economy in starting probably cavalry to march part of the distance in advance of the infantry before they took the train, but always taking care that they should arrive at their destination at the appointed time with the other arms of the Service. As to what my friend Mr. Scotter says, as to moving an Army Corps in a shorter space of time than that I have mentioned, I was careful, as I told you, not to over-estimate the possibility of accomplishing a given object. If my paper is of any value at all, it is not so much as to the time it would occupy, or the other details which are more fully and amply set out in the "Soldier's Pocket Book," which I have had the opportunity of studying to a slight extent in preparing this paper, and of which I must confess to a most imperfect knowledge of the details. My first object is to show that in carrying out a great operation, all the necessary individual appliances of railway stock were in the possession of the railways, and that they were ready and willing at the word of command to place them at the disposal of the State; but that when you come to move large bodies of troops and conduct great operations you must at the point of departure, in proportion to the amount of work you have to do, and at the point of detrainment, be provided with the ample means and appliances which are necessary to prevent delay and confusion. I will tell you one principle which I know, and which you have all experienced, I have not the slightest doubt in the world, and that is, that the number of trains that can be carried over a given railway is not greater than what you can digest at the terminal railway station. If you take Cannon Street or Charing Cross, you know how unpleasantly and how angrily sometimes you are detained outside because a train is in the way, and you cannot get inside because another train is occupying the space that you want to go into and occupy in order to get out of the train. That is just the principle with regard to the detrainment of troops. If troops are out of the train, and you have not the means of getting the train out of the way of the next train, it follows as a matter of course there is delay all along the line. I dare say in the statement I have made as to the time that would be occupied, it might be possible to tighten it up and run a little more quickly, and carry out the operation more expeditiously in many ways; but it struck me as most remarkable, as a civilian at least, that the number of horses attached to an Army Corps is nearly half the number of men. For instance, in an Army Corps, including twenty-one battalions of infantry, there are 33,000 non-commissioned officers and men, but there are nearly 13,000 horses to move from one point to another in carrying that Army Corps, assuming that they all go from a point where the Army Corps has been concentrated. I do not know whether Lieutenant-Colonel Scotter has considered the question of entraining 12,934 horses, but to load a train of horses certainly would take at least half an hour, and I have shown you that it takes nine trains to convey two regiments of cavalry, and therefore you must make every allowance for the quickness with which infantry can be moved and the inconvenience which is necessary in moving such a large number of horses. All I can say is, that I am very glad to find that I have perhaps rather over-estimated the time that would be necessary. I hope in the meantime no disaster will be likely to happen in front from the troops not coming up, because I have no doubt we could put on steam and get over that difficulty. If there is anything in my lecture at all, it is this, that ample provision should be made, both at the point of departure and at the point where a large body of troops have to be dealt with, and, above all,

that when you want a large quantity of stores moved you should have practically a railway station improvised at the moment, where you can deal with the loading and unloading of wagons, and not commit the mistake which appears to have been committed in former campaigns on the Continent, of having wagons that could not be unloaded, and nowhere to put the goods when they were unloaded. I thank you very much for the attention you have given me.

Lord WOLSELEY: Ladies and gentlemen, I think you will agree with me that the lecturer need not have apologized in any way whatever for having brought this subject before our notice to-day, because I think, no matter how the subject may be dealt with in technical books, it is one to which the attention of military men cannot be too frequently directed. I regret to say that it is a subject which has not been as well studied as it might have been by many even of our Staff Officers. I was glad to hear Mr. Findlay say at the beginning of his lecture that he intended to deal with the matter, not only in a practical, but in a business-like, way. It is a subject which should be, above all others, dealt with in a business-like fashion, but in fact there is not any practical military subject which comes up for discussion in this theatre, and certainly no great subject bearing upon the efficiency of the Army, which should not be at first dealt with upon business lines. The great fault I have always had to find with our old-fashioned Regulations, the Regulations of old times, was that they were not based upon business principles, and if you have to deal with any great subject connected with the Army your first object ought to be to deal with it upon purely and essentially business principles. It has been pointed out by Colonel Fraser that a great deal of the matter referred to by the lecturer has been already brought to notice in a book with which I am somewhat familiar myself, I mean in the "Soldier's Pocket Book." The article on "Railways" in that Pocket Book is compiled from all the information available, both at home and abroad, on this very difficult and very interesting question. There are several points which the lecturer has referred to which have been there laid down, I may almost say definitely, from the war experience of foreign nations. The book from which I quoted very largely in it was written shortly after the Franco-German War, by Colonel Jaquemin, a French Staff Officer, who devoted a great deal of time to the study of the movement of troops by rail. It is a very interesting pamphlet, not at all long, and I would recommend it to all those who wish to study this subject. He points out very clearly that the great source of the misfortunes they had to deal with at the beginning of the war arose from the ignorance of the French Staff as to the means and power of moving troops by rail during war. He gives you the most heart-rending account of some of the great railway stations in France being blocked completely for two or three days, blocked up so as to render the lines altogether useless for military purposes. He points out how troops were often almost starving for want of the provisions with which some railway stations 50 or 100 miles off were crammed. The provision wagons could not be moved, as the lines were blocked through mismanagement. The lecturer has laid a great deal of stress upon the importance of employing, in the event of an invasion of this country, a Staff composed of the traffic managers of our great railway companies. I am sorry he did not communicate with me before he delivered this lecture; had he done so, I could have told him that this is the plan upon which we intend to regulate the movements of our troops in the event of necessity. Indeed, I could have given him a great deal of information in print, and shown him the Regulations which we have already laid down upon this subject, to be adhered to in the event of war. Our plan is exactly the plan that he has so ably and so interestingly described to us. Under the present organization of the Staff of the Army, the Quartermaster-General is charged with moving and feeding the troops in the field. He has to move the troops to their destination, to feed them *en route*, and when they reach the theatre of operations. In our recently compiled Code of Regulations, now some long time in print, although not yet actually published, the movement of troops and the command and administration of the lines of communication are very carefully attended to. The lecturer referred to the fact that England has no frontier. That is a point upon which I think we ought to congratulate ourselves; having no frontier, we are able to defend our coasts by the magnificent fleet upon which we so justly depend. And I may make use of this opportunity of saying, in

passing, this is a point which has been referred to very lately in the House of Commons, when the advisability of providing us with a frontier by joining England to France with a covered-in isthmus was discussed. I earnestly hope the fact of our having no frontier may be a fact that will last for ever. The lecturer has referred to the experience which railway traffic managers gain by race meetings, and the movement of crowds of civilians on bank holidays. I cannot say that we derive from this experience any very useful data for the movement of troops. You may move half a million of people from London to Epsom in the course of a day, and gain very little information that would be particularly useful in the movement of 50,000 troops. It is not generally remembered that a soldier is not a man who merely carries a pair of racing glasses over his shoulder, but he has a rifle, a large quantity of ammunition, and provisions in his haversack for one, two, or even three days. Besides, every battalion is necessarily accompanied by a certain number of provision and store wagons. There is a certain number of horses for the Staff of the regiment; a large supply of ammunition is also carried in carts or wagons. In fact, the *impedimenta* to be despatched with a battalion of infantry or regiment of cavalry is so large, that, according to the experience we have had hitherto in the movement of troops, I think the lecturer was correct when he said that we could with difficulty embark a battalion of infantry with all its *impedimenta* in a shorter time than thirty minutes. It should be remembered, however, that the *impedimenta* upon which he based his calculation are the *impedimenta* with which we should take the field abroad. If we ever have to mobilize for home defence, we shall not require the same large scale of transport we should want for operations on the Continent. To supply an army in our own country, where we should find provisions always near at hand, it would not be necessary to carry about with us so large an amount of food as we should have to do abroad, and in perhaps a hostile country. The lecturer told us that our soldiers are not very well trained in either entraining or detraining. I grant that we are not, perhaps, as well trained as other nations are upon this point, but foreign armies have almost absolute command over their railways, which are generally the property of the State. We have not that same power over the lines in our own country; but I do not think our men are so badly drilled in this respect as he thinks. In the experience I had as Quartermaster-General of moving large bodies of troops backwards and forwards at some of our great reviews, I calculated what was done upon each of those occasions very accurately. I was myself present at a good deal of the embarkation of the troops in railway carriages, and I thought they did it remarkably well, and, considering all things, I may say very well, and without any hitch; but I quite agree that we might have more experience, and that experience, as the Quartermaster-General has told you, we hope to gain very soon by means of a short railway which we are now constructing at Aldershot, for other purposes outside this one. We shall, however, use it also for the purpose of giving our soldiers experience in getting into trains and getting out of them. The lecturer and others referred to the arrangements made by Mr. Childers for the movement of troops over English railways in times of peace. He inferred that the rates fixed upon precluded the possibility of our moving troops in large numbers generally by rail. In the interests of economy we prefer, as he has described, sending a battalion of Guards from London by sea round the Land's End to Dublin, to sending them across country by rail. That, of course, is a point which is very easily rectified if he and the other railway managers would come forward and promise us that they will carry our men as cheaply by railway as we are now able to send them by sea; we shall be most glad indeed to meet him at once, and to close with his terms; but, as far as I know, the expense would be considerably greater than the expense incurred in sending them by sea. Then, again, he has forgotten another point. Although it may be very important to give our men great experience in getting into trains and out of them, transport by sea is very important also, as giving our men experience of sea transport. In the ordinary course of our military routine, our troops, more than the troops of any other nation in the world, have to make long voyages by sea. I quite agree with him that the terms which were then agreed upon by Mr. Childers are perhaps high, but I am quite certain that Mr. Childers made the best bargain he could, and if those terms were not better for us, it was

not his fault, but the fault of those with whom he had to deal. From my own experience of the conveyance of Officers by rail, I can tell you that when I ask the ticket man at a railway station whether it would be more economical to buy a soldier's ticket or to take a return ticket as an ordinary passenger, I am generally told that the return ticket as an ordinary passenger is the cheaper arrangement. The fact that Lieutenant-Colonel Scotter did not quite agree with the lecturer in all the points he touched on in his lecture proves to me how very essential it is that everything bearing on the movement of bodies of troops by rail should be discussed by a central body composed of some military Officers and the great railway managers of this country. I am very glad to say, as Sir Redvers Buller has told you, that we shortly hope to lay before the railway people of this country a very large scheme indeed for the movement of troops in the event of mobilization for home defence. This will bring before them in a practical form the many points discussed here to-day. I am sure they will work out those problems to the benefit of the country, and certainly to the advantage of the Staff of the Army. It only remains for me, on your behalf, to convey to the lecturer, Lieutenant-Colonel Findlay, our sense of gratitude for his kindness in coming here to-day and giving us his interesting lecture, a lecture not only interesting in itself, but of decided use to all who have heard it, because it cannot fail to turn our attention to a matter which is of very great, of vital, consequence and importance to all who have to do with the administration or command of the Army.

Friday, July 4, 1890.

REAR-ADMIRAL N. BOWDEN-SMITH in the Chair.

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## ON SPONTANEOUS IGNITION AND EXPLOSIONS IN COAL BUNKERS.

By Professor VIVIAN B. LEWES, F.I.C., F.C.S., &c.,
Royal Naval College.

AT the last meeting of the Institute of Naval Architects, I had the honour of reading a paper on the spontaneous ignition of coal cargoes, and inasmuch as the remarks I then made have been on several occasions criticized as though they also applied to coal bunkers, I am glad of the opportunity of bringing the latter question before you, and explaining my views on a subject which is daily becoming of greater importance in the Mercantile Marine, and which will probably before long demand attention in the Service.

In the fast ocean steamers it is now becoming an event of frequent occurrence for the contents of the bunkers to spontaneously ignite, and many a hand to hand struggle has been waged between decks without the passengers even suspecting the threatened danger, whilst in the Service such a thing as fire in the bunkers is practically unknown, and an occasional, although fortunately very rare, explosion of gas is the worst trouble which the coal stores of our naval monsters have given rise to.

In order to explain this apparent discrepancy, I must direct your attention to the causes which give rise to the so-called "spontaneous ignition of coals," and trace the particular circumstances which tend to increase the tendency to it.

Coal is a fossil fuel of purely vegetable origin, and may be looked upon as consisting of three distinct parts: (1) carbon, (2) hydrocarbons, and (3) mineral impurities, either derived from the sap of the original plants which by their checked decay formed the coal measures, or else which have filtered into the coal, during its formation, from the surrounding soil.

Of these three factors it is the carbon which forms the bulk of the coal, and which during combustion gives the chief portion of the heat which is evolved, whilst the hydrocarbons, as soon as the coal is heated, escape as gaseous products and give the fuel the power of burning with flame, and it is upon the proportions in which these principal constituents of the coal are present that the characteristic

properties of the various varieties of coal, to a great extent, depend; for instance, in a good Welsh anthracite the percentage of carbon is very high, whilst the amount of volatile hydrocarbons is very low, with the result that the anthracite is hard to kindle and burns almost without flame, whilst a marked contrast to this is a good Cannel, or even Wallsend coal, in which the percentage of carbon is considerably smaller, but in which the percentage of hydrocarbons is very high, with the result that such coals easily ignite and burn with a considerable amount of flame, or can be utilized for the production of coal gas.

The mineral substances, which are practically the impurities in the coal and mainly form the ash left after combustion, consist of sulphate of lime (gypsum), alumina, silica, and disulphide of iron or pyrites, which latter forms the so-called coal brasses found in most seams to a greater or less extent.

It is, however, the carbon and hydrocarbons of the coal which play the most important part in the phenomena of heating and ignition, whilst the brasses, although they have for many years been credited with the responsibility of bringing about this action, have in reality but little to do with it, their action being at best subsidiary.

The ordinary combustion of coal consists of the rapid chemical combination of its chief constituents, carbon and hydrogen, with the oxygen present in the atmosphere, and the formation of carbon dioxide and water vapour, the intensity of the heat increasing with the rapidity of the chemical action, so that a greater intensity of heat is obtained from a fire the combustion of which is urged on by an artificial blast than from one in which the fuel is burning under ordinary conditions; the reason being that the more rapid passage of air over the burning fuel supplies the oxygen necessary for the chemical action more quickly, and by increasing the rate of combustion also increases the rate at which the heat generated by the action is evolved.

Such ordinary combustion is started by application of heat to the fuel, and in order to explain the causes of spontaneous ignition and the steps which it is possible to take for its prevention, we must first consider the temperature necessary to start this rapid form of chemical action, and secondly, the possible factors which might lead to such a temperature being reached in the coal bunkers of a vessel.

In order to start rapid oxidation, *i.e.*, combustion in the coal, a definite temperature known as the "point of ignition" has to be reached, and this I have determined for various kinds of coal by projecting them in the form of powder upon the surface of molten metals at known temperature, and find that the necessary degree of heat varies with the kind of coal from 700° F. upwards, Welsh steam coal of the kind most ordinarily employed requiring a temperature of 870° F. to ignite it:—

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|---|---|---|---|
| Cannel coal | ignites at | 697° F. | = 370° C. |
| Hartlepool coal | „ | 766° F. | = 408° C. |
| Lignite | „ | 842° F. | = 450° C. |
| Welsh steam coal | „ | 870·5° F. | = 477° C. |

In other words, it requires a low red heat to ignite any of the ordinary forms of coal, and, inasmuch as contact with anything approaching this temperature is practically an impossibility in the coal bunkers or cargo of a vessel, it is evident that some other cause for the generation of the requisite heat must exist.

Combustion is merely a convenient name which has been adopted to express those rapid forms of chemical action which give rise to flame or visible incandescence, but many substances are capable of undergoing the same action in so tardy a fashion that the heat generated is dissipated before it can become manifest to our senses, and although the same amount of heat is given off for each unit weight of the substance consumed, the action is spread over so long a period of time that at no one moment is enough heat generated to become apparent.

When a log of wood is allowed to rot away under the combined influence of air and moisture, it undergoes practically the same change as if it had been rapidly consumed on a fire, and the same amount of heat is evolved, but the log is consumed during the rapid combustion in a few hours, whilst many years will probably be required for the completion of the action by processes of decay, so that the heat which can be detected and utilized in the one case, in the other is dissipated and escapes detection.

With substances capable of undergoing this process, which is known as "slow combustion," it often happens that the accidental surrounding of the body with a bad conductor of heat will cause a rise in temperature, due to the slowly generated heat being unable to escape, and, as rise of temperature aids all chemical action, the rapidity of the slow combustion increases until the temperature is reached at which the action makes itself manifest as rapid combustion, *i.e.*, the point of ignition is attained, and the rapid chemical action is now accompanied by flame and incandescence.

The pyrites or coal brasses present in the coal when exposed to dry air undergo little or no change, but when moisture as well as air is present they absorb oxygen and combine with it, forming sulphates of iron, and the ordinary explanation of the spontaneous ignition of coal is that this process of oxidation causes a rise of temperature in the coal which determines its ignition; this, however, has of late years been much doubted, and it can now be proved that the pyrites when present in ordinary quantities are perfectly incapable of doing more than adding slightly to the general rise of temperature, although when present in very large masses they may increase the tendency of the coal to spontaneous combustion by swelling during oxidation, and causing the coal to crumble, and also by setting free sulphur, which having a lower point of ignition than coal (482° F., or 250° C.) would lower the temperature at which the mass would catch fire.

The real causes which give rise to heating and ignition in any large accumulation of coal are two-fold. First, the absorption of oxygen from the air by the carbon, and secondly, the chemical action set up by the absorbed oxygen with the hydrocarbons of the coal.

Carbon is one of those substances which possess to an extra-

ordinary degree the power of attracting and condensing gases upon their surface, this power varying with the state of division and density of the particular form used. The charcoal obtained from dense forms of wood, such as box, exhibits this property to a high degree, whilst certain kinds of coal also exhibit the same power, although to a less extent. The absorptive power of newly won coal, due to this surface attraction, varies, but the least absorbent will take up $1\frac{1}{4}$ times its own volume of oxygen, whilst in some coals more than three times their volume of the gas is absorbed. This absorption is very rapid at first, but gradually decreases, and is, moreover, influenced very much by temperature, for reasons which will be explained later, and this absorption itself causes a rise in temperature which aids the action that is taking place.

The rate of absorption varies with the amount of surface exposed, and therefore able to take part in the condensing action, so that when coal or charcoal is finely powdered, the exposed surface being much greater, absorption becomes more rapid, and rise of temperature at once takes place.

If charcoal is kept for a day after it has been made out of contact with air, and is then ground down to a powder, if will frequently fire after exposure to the air for thirty-eight hours; whilst a heap of charcoal powder, of 100 bushels or more, will always ignite. It is for this reason that, in making the charcoal for gunpowder, it is always kept, after burning, for three or four days in air-tight cylinders before picking over, and ten days to a fortnight before it is ground.

In the case of coal, this rise in temperature all tends to increase the rate of the action which is going on; but it is rarely sufficient to bring about spontaneous ignition, as only about one-third the amount of oxygen being absorbed by the coal that is taken up by the charcoal, and the action being much slower, tends to prevent the temperature reaching the high ignition point of the coal. Air-dry coal absorbs oxygen more quickly than wet coal. The oxygen so absorbed is in a chemically more active condition than when present in the air, as, in the first place, it is in a condensed condition, and, secondly, is diluted with less nitrogen than in the air, as the carbon absorbs a higher proportion of oxygen than of nitrogen, and this oxygen so absorbed rapidly commences to attack the hydrocarbons present in the coal, having apparently but little action on the carbon itself.

During this action the hydrogen of the hydrocarbons unites with the oxygen to form water, which mostly escapes as vapour, whilst the carbon unites with oxygen to form carbon dioxide, or carbonic acid gas, and both these actions result in the generation of heat, which, under ordinary circumstances, is dissipated to surrounding bodies, but which, when generated in the centre of a mass of fine coal—which, owing to the fact that its interstices are filled with air, is an admirable non-conductor of heat—causes a rise of temperature, which in turn increases the rate of action and generation of heat until a temperature is reached at which the so-called spontaneous ignition ensues.

The most important point to be noticed is the extraordinary effect

which initial temperature has on the rapidity of chemical actions of this kind. At a low temperature and indeed up to about 100° F. = 38° C., the absorption of oxygen, and consequent chemical action, will go on slowly with practically little or no chance of undue heating taking place, but directly the temperature exceeds 100° F. then, with some classes of coal, ignition is only a question of time and mass.

Although the ignition point of various coals lies above 700° F., yet if many of these coals are powdered, and are placed in perforated zinc cases in masses of 2 lbs. or upwards, and these are kept at a steady temperature of about 250° F. in an oven, ignition will generally follow in a few hours, whilst between this and 150° F. it will take days instead of hours for the same result to follow, and at ordinary English temperatures several thousand tons of coal would have to be stored in a very broken condition before any risk of heating or ignition would ensue. In considering this question with regard to coal bunkers it must be remembered that, although the considerations which had to be taken note of in the case of coal-laden ships still exist, yet they are considerably modified by the smallness of the amount of coal carried, and by the methods of loading and storage employed.

In my paper, before referred to, I pointed out that liability to spontaneous ignition increases with:—

1. *The increase in the bulk of the cargoes.*—Evidence given before the Royal Commission of 1875 showed that in cargoes for shipments to places beyond Europe the cases reported amount to $\frac{1}{4}$ per cent. in cargoes under 500 tons; in cargoes from 500 to 1,000, 1 per cent.; 1,000 to 1,500, to 3·5 per cent.; 1,500 to 2,000, to 4·5 per cent.; and over 2,000 tons, to no less than 9 per cent. Mass influences this action in two ways:—

(*a.*) The larger the cargo the more non-conducting material will there be between the spot at which heating is taking place, and the cooling influence of the outer air.

(*b.*) The larger the cargo the greater will be the breaking-down action of the impact of coal coming down the shoot upon the portions first loaded into the ship, and the larger thereby the fresh surface exposed to the action of the air.

2. *The ports to which shipments are made* (26,631 shipments to European ports in 1873, resulting in only ten casualties, whilst 4,485 shipments to Asia, Africa, and America gave no less than sixty).—This startling result is partly due to the length of time the cargo is in the vessel, the absorption and oxidation being a comparatively long action, but a far more active cause is the increase of temperature in the tropics which converts slow action into a rapid one.

3. *The kind of coal of which the cargo consists* (some coals being especially liable to spontaneous heating and ignition).—There is great diversity of opinion on this point, but it is pretty generally admitted that cases of heating and ignition are more frequent in coals shipped from east coast ports than in South Wales shipments. So much, however, depends upon the quantity of small coal present, that a well-loaded cargo of any coal would be safer than a cargo of Welsh

steam coal in which a quantity of dust had been produced during loading.

4. *The size of the coal* (small coal being much more liable to spontaneous ignition than large).—This is due to the increase of active absorbent surface exposed to the air, a fact which is verified by the experience of large consumers of coal on land; gas managers recognizing the fact that coal which has been stamped down or shaken down during storage is more liable to heat than if it has been more tenderly handled, the extra breakage causing the extra risk.

5. *Shipping coal rich in pyrites* (*or brasses*) *whilst wet.*—The effect of external wetting on coal is to retard at first the absorption of oxygen, and so to check the action; but it also increases the rate of oxidation of the pyrites, and they, when oxidized, swell and split the coal into pieces, and this increases heating due to the exposure of fresh dry surfaces.

6. *Ventilation of the cargo.*—For ventilation to do any good, cool air would have to sweep continuously and freely through every part of the cargo—a condition impossible to attain in coal cargoes—whilst anything short of that only increases the danger—ordinary methods of ventilation supplying just about the right amount of air to create the maximum amount of heating. The reason of this is clear. A steam coal absorbs about twice its own volume of oxygen, and takes about ten days to do it under favourable conditions, and it is this oxygen which, in the next phase of the action, enters into chemical combination, and causes the serious heating. Ventilation, such as used to be sometimes arranged for by a box-shaft along the keelson with Venetian lattice upshafts, supplies about as much air as is necessary to produce the results which end in spontaneous ignition.

7. *Rise in temperature in steam colliers, due to the introduction of triple-expansion engines and high-pressure boilers.*—The increase in stokehold temperature, due to this, is from 5° to 10° F., and this affects the temperature of the adjacent parts of the vessel.

Having pointed out these causes as contributing to the evil in question, I then proceeded to make certain suggestions which, in my opinion, would tend to minimize the risk of spontaneous ignition, and these were, that coal intended for shipment to distant ports should be as large as possible, free from dust, and with as little "smalls" as can be helped. It is better as free from pyrites as possible, in order to prevent disintegration after shipment, and it should contain, when air-dried, not more than 3 per cent. of moisture; the quantity of moisture in an air-dried sample of coal being a sure index to the absorptive power, the higher the amount of moisture held by the coal after exposure for some time to dry air, the greater will be its power of absorption for oxygen, and therefore its liability to spontaneous heating and ignition.

This is well shown in the following table, in which the liability to spontaneous combustion in certain coals is contrasted with the percentages of pyrites and moisture present:—

| Liability to spontaneous ignition. | Pyrites per cent. | Moisture per cent. |
|---|---|---|
| Very slight | 1·13 | 2·54 |
| | 1·01 to 3·04 | 2·75 |
| | 1·51 | 3·90 |
| Medium | 1·20 | 4·50 |
| | 1·08 | 4·55 |
| | 1·15 | 4·75 |
| Great | 1·12 | 4·85 |
| | 0·83 | 5·30 |
| | 0·84 | 5·52 |
| | 1·00 | 9·01 |

No coal should be shipped to distant ports until at least a month has elapsed since it was brought to the surface at the pit's mouth. Every precaution should be taken to prevent breaking up of the coal whilst being taken on board, and on no account must any accumulation of fine coal be allowed under the hatchways. When possible, the coal should be shipped dry, as external wet, by producing oxidation of the pyrites, causes disintegration.

As regards precautions to be taken on board, I advocated that the bulkheads dividing that portion of the hold of the vessel from the remainder *should be made gas-tight*, and that small steel cylinders, containing liquid carbon dioxide, and closed by fusible plugs, should be placed at intervals throughout the cargo, so that if heating took place, the plugs would melt and the liquid would be rapidly converted into gas and cause intense cold, which, together with the liberated carbon dioxide, would effectually prevent any ignition of the coal, whilst the temperature of the cargo could be determined by automatic thermostats, communicating with an electric bell in the Captain's room.

In order to prevent access of air to the cargo, and so to keep away, as far as possible, oxygen, I advised that the hatches should be closed as soon as the cargo had been taken on board, and that the only ventilation should be a 2-inch pipe just inserted into the crown of each coal compartment, and led 12 feet up the nearest mast, the top being left open. This would be quite sufficient to allow free egress to any gases evolved by the coals, but would not allow undue excess of air.

It must, however, be remembered that this is only advocated for coal cargoes, and on the supposition that the bulkheads can be made gas-tight, as if this were not so, gas from the coal would leak into the inhabited part of the ship, and greatly increase the risk of explosions, also with this system of closing up coal holds it would be necessary to take precautions upon the arrival of the ship at her destination. On removing the hatches no naked light must be allowed near them, and no one must be allowed to descend into the hold until all the gases

have had time to diffuse out into the air. If the cylinders have gone off there will be but little fear of explosion, as a high percentage of the carbonic acid gas lowers the explosive power which the mixture of marsh gas (given off from some coals) and air possess; but the carbonic acid gas would overcome and suffocate a man descending into an atmosphere containing any considerable percentage of it. When a safety lamp, lowered into the hold, continues to burn as brightly as it did in the open air, then it is perfectly safe to descend.

In the case of coal bunkers in modern steamers and war ships, the conditions under which the coal is placed are so totally different from those existing in a collier, that no comparison can be drawn between them.

In the coal bunker, the question of mass, which plays so important a part in a hold laden with coal, is almost entirely eliminated, as 50 to 400 tons would be about the capacity of any ordinary bunker, and it has been before shown that the cases of spontaneous ignition in masses of coal less than 500 tons does not amount to more that $\frac{1}{4}$ per cent., and the question of initial temperature becomes the most important factor.

A few years ago such an occurrence as a coal bunker on fire was rare, whilst at the present time hardly a week passes without some more or less serious cases occurring on the fast liners, and it is evident that there must exist some well-defined cause for this enormous increase in cases of spontaneous ignition. On collecting evidence on this point, the first thing that strikes one is that bunker fires are almost entirely confined to vessels in which the bunker bulkheads are only separated from the funnel by a narrow air-space, or are in close proximity to the boilers themselves, but where the bunkers are stepped back from the funnel casing and boilers, spontaneous ignition is a great rarity.

Taking the case of a fast liner, it is found that the temperature in a coal bunker varies very considerably, according to its proximity to the air channel round the funnel casing. Close to the outside of the bulkhead the temperature is often as high as 200° F. = 93° C., whilst inside 120° would be a fair estimate, and from the centre of the bunker to the side of the vessel it is seldom above 75° F. = 24° C., the temperature, however, being higher near the iron decks, which, being in contact with the heated bulkhead, conduct the heat through the coal, and raise the temperature often up to 100° F.

It has been pointed out that if coal is kept at a high temperature, even though it be far below its igniting point, ignition is only a question of time, and if the bunker coal next the bulkhead is kept at 120° F., any coal with a tendency to absorb oxygen will run a great chance of igniting within a few days. It is manifest that if this is the real cause of ignition, the seat of the fire ought to be found close to the heated bulkhead, but this is very often not the case, the mass of fire being found near the centre of the bunker, and sometimes even towards the side of the vessel; but careful examination soon reveals the cause of this, as a line of charred coal is mostly to be

found running from the heated bulkhead to the seat of active combustion, showing that the fire started by the high initial temperature has not had sufficient air near the bulkhead to do more than smoulder, but that as soon as it came in contact with a current of air passing up through the coal from the hatches in the decks, the smouldering mass began to burn fiercely.

In order to prevent spontaneous ignition of the coal under these circumstances, all that is necessary is to reduce the temperature of the bulkhead in contact with the coal, as if this is kept at a temperature not exceeding 80° to 90° F., there is little or no fear of the oxidation of the hydrocarbons of the coal proceeding with such rapidity as to cause ignition in such a quantity of coal as can be carried in the bunkers, the iron decks, by subdividing the mass, also helping to reduce any risk.

In order to reduce the temperature to the required extent it would be necessary to make the bulkheads close to any heating surface, such as the funnel casing, double, and the sides spaced 6 inches apart, the inner wall being provided at intervals with watertight openings, through which the interior space can be coated with protective compositions from time to time. Through this double casing sea-water would be allowed to circulate very slowly, and would effectually prevent any undue rise of temperature, whilst to make the arrangements complete a thermostat should be fixed on the inner plate of each bulkhead, which, if the temperature rose to 100° F. = 38° C., would ring a bell in the Captain's room, when the rate of flow of water could be increased until the required fall in temperature took place.

Should this arrangement prove impossible from any structural cause, then a rapid current of air forced through the bunkers by means of a fan, or even an up-current formed by a good air-pump ventilator in the crown of the bunker, would go far to keep the temperature within safe limits. If such an arrangement as I have here advocated were adopted in the fast liners, I feel sure that bunker fires would become a thing of the past, whilst such an arrangement of double bulkhead and water circulation would also solve the still more important problem of how to keep the magazines on board Her Majesty's ships at a sufficiently low temperature to fit them for the storage of E.X.E. and S.B.C. prism powders, and the still more delicately constituted smokeless powders, none of which could otherwise be kept in the auxiliary magazines of the new programme ships; as for safety they are placed between the boilers, and must, of necessity, reach a temperature far above that which any powder could stand without losing moisture, and in consequence developing far higher strains than the guns should properly be subjected to.

The question of explosions in coal bunkers and in the holds of coal-laden ships is a subject totally distinct from that of spontaneous ignition. During the conversion of woody fibre derived from various forms of vegetation into coal, considerable quantities of a gaseous compound of carbon and hydrogen called methane, marsh gas, or light carburetted hydrogen is evolved, and as the action has been

spread over long ages most of this gas has found its way to the surface of the coal seam and has diffused itself through the superincumbent soil and has escaped; but a portion has been occluded (absorbed) in the pores of the coal itself and some also imprisoned in small cavities and fissures in the coal.

The amount of gas so occluded varies with the pressure existing upon the gas, so that when a shaft is sunk into a seam of coal, and the pressure existing on the gas in the coal near the shaft is relieved, the absorbed gas is slowly given off from the newly exposed surfaces, whilst where a crack or fissure has been cut the pent-up gas issues often in the form of a "blower" into the working of the mine.

The volume of the gas so given off is very large, and in some mines may be counted as hundreds of cubic feet per minute.

The gas occluded in the coal is only slowly given off, and with some coals a slow discharge from its surface continues for some time after its exposure to the ordinary atmospheric pressure, becoming more rapid with a fall in the barometer or with any great increase in temperature; so that if a freshly won coal be at once stored in an enclosed space, such as the hold of a ship, a certain proportion of marsh gas is nearly always to be found present in the air.

Marsh gas, when pure, is perfectly non-explosive and burns quietly with a faint luminous flame, producing as the products of its combustion carbon dioxide and water vapour, but when mixed with ten times its own volume of air and a light applied it explodes with a force equal to about 210 lbs. on the square inch.

Ten volumes of air mixed with one volume of the marsh gas gives theoretically the most explosive mixture, although practice points to a slightly smaller proportion of air (9·4), but there is a margin on either side of this proportion within which all mixtures are explosive; when there is one volume of marsh gas to thirteen of air the mixture is slightly explosive, and its explosive power increases with increase in the quantity of marsh gas present until the maximum effect is reached with one volume of marsh gas to ten of air, and as soon as this point is passed the explosive power again diminishes until a mixture containing one part of marsh gas to five of air is obtained, when it again becomes non-explosive. It very rarely happens that the exact proportions necessary to give the maximum effect are present, so that very varying results occur.

Another cause which tends to increase the danger of explosion is that if the air is charged with fine coal dust, less than 1 per cent. of marsh gas mixed with it gives an explosive mixture, and also extends the area of explosion.

In both collieries and coal bunkers the risk of explosion is greatest during the first ten days after shipment; indeed, the largest proportion of explosions have taken place before the vessel has left harbour, or immediately afterwards, and have been caused by the coal being loaded too soon after being worked and whilst still giving off gas, which, mingling with the air in the hold, has formed with it an explosive mixture which has been ignited by the careless introduction of a light, or else the gas from the hold has

leaked through faulty bulkheads into the other parts of the ship, and coming in contact with fire, has exploded.

In considering the precautions to be taken to prevent such explosions, everything must depend upon the vessel. With coal cargoes, if the vessel is a sailing ship, with at best a collision bulkhead and a partition aft, then it is obviously impossible to prevent the gas given off from the coal from penetrating to other parts of the vessel, and the only precautions which can be taken are to make sure that at least a month has elapsed since the coal left the pit, and to give ample surface ventilation during the first few days after shipment, during which time the breaking of the coal incidental to loading might, by exposing fresh surface, have caused a slight liberation of occluded gas.

In ships built for the carriage of coal, the portions of the vessel in which the coal is placed should be made as gas-tight as the tanks of a petroleum ship, and if the bulkhead nearest the engines was made double and with water circulation, this could easily be done, the only communication with the open air when the hatches were closed being a 2-inch pipe led a considerable height up the nearest mast, so as to be well out of the reach of any flame.

In such a hold, the hatches should be well battened down gas-tight, as soon as the coal is taken aboard, and not opened until the vessel arrives at her destination, when the precautions before enumerated should be taken before any light is allowed in or near the hold.

Marsh gas is a non-supporter of combustion, so that the presence of the gas, or a mixture of it with air, is a safeguard against spontaneous ignition; and if the precautions I have pointed out to prevent ignition were carried out in conjunction with these simple precautions against explosion, I am convinced that explosions and fires in coal cargoes and bunkers would soon be a thing of the past.

In the bunkers of all new vessels, I should strongly advocate the adoption of the double bulkhead and water circulation to such portions of the bunkers as impinge upon any unduly heated portion of the hold, and that all bulkheads should be made gas-tight; whilst in bunkers containing not more than 300 to 400 tons of coal, as thorough ventilation as possible should be obtained by fitting water-tight air-pump ventilators in the deck above the surface of the coal, while inlets for as cool air as possible should be provided at the bottom of the bunkers, and, where necessary, air driven in from the fan, and under no conditions should any but safety lamps be used in coal holds or bunkers.

To sum up:—When perfect ventilation can be secured, and a cool, fresh current of air can be made to continuously pass through a mass of coal, then no risk of ignition or explosion exists, as the coal will be kept below the temperature at which oxidation is likely to take place to any serious extent, and any gas given out by the coal will be swept away.

Imperfect ventilation, on the other hand, is the greatest source of danger, a limited supply of air giving enough oxygen to carry on oxidation without being able to lower the temperature, and so causing

ignition; whilst the air forms an explosive mixture with any marsh gas which may be given off from the coal.

In a coal cargo, perfect ventilation is impossible on account of the mass of coal present, and therefore the hold should be battened down, and everything done to prevent imperfect ventilation; gas-tight bulkheads being a necessity for this purpose.

In coal bunkers, on the other hand, on account of free access being obtained to both top and bottom of the coal, and also the small mass present, perfect ventilation is possible, and should be attempted, whilst the water bulkheads will do away with any undue rise of temperature.

Admiral COLOMB: I am sorry that Mr. Lewes has not a larger audience. I am afraid it is always the case when a paper is postponed; people make engagements beforehand, and they cannot break them when the time comes. I am sorry for this, because I think every person who has been present must have greatly enjoyed the lecture and the extremely lucid way in which the explanation, first of spontaneous combustion and then of explosion, has been given to us. The practical outcome of these beautiful experiments which we have seen to-day, bringing so vividly to our minds what actually takes place on these occasions—the practical outcome of all as proposed by the lecturer, as far as concerns men-of-war, with which we are chiefly connected—is extreme simplicity. We are given at the end one or two simple rules by which these explosions and spontaneous combustions can be avoided. I suppose that in the newer ships the breaking up of the bunkers into such small spaces has done away, to a great extent, at any rate, with these dangers. My own experience has been that some of the most anxious hours I have spent in the Service in command of a ship have been where a bunker has ignited spontaneously, and where we have been for hours and hours endeavouring to extinguish it, fearing throughout that we should have had a fire which we could not have got under control. I suppose by division, now, a great deal of that has passed away, but the danger always remains, and to encounter the danger it is necessary to get at the exact cause. I think everybody who has listened to the paper must feel that the exact cause has been put before us. Although for men-of-war the dangers are not so great as they are for the Mercantile Marine, the putting forward of these exact causes is certain to lead to the proper means of combating them, and Mr. Lewes may presently have to congratulate himself on inducing ship-builders and ship-owners to take the precautions which he recommends, so as to get rid of these dangers which so greatly interfere with commerce, and I dare say cause a great many losses of ships, of the fate of which we have no particulars.

Mr. W. E. STANLEY-THOMSON: Mr. Chairman and gentlemen, as there seems to be a scarcity of speakers, I will venture to make a few remarks; not that I think the observations I can make will be in any way in opposition to the views laid down in the paper, because, on the whole, I am inclined to agree with them. I have, from my official position, had occasion for a number of years to take notice of all the cases of spontaneous combustion which have been inquired into by Courts of Investigation into shipping casualties, and when I read the newspaper report of Professor Lewes' last paper on the subject, I gave it a great deal of attention, for the reason that it upset many of the theories which have hitherto been held by those Courts. Professor Lewes has mentioned the Royal Commission which sat in 1875 on "Spontaneous combustion in coal cargoes." The report of that Commission laid down certain principles, which have been the guides of all Courts of Inquiry. The main feature of their recommendations is, that special attention should be given to the coal intended for shipment, so as to ensure that it contains as little as possible of pyrites, inasmuch as pyrites was, in their estimation, the primary, if not essentially the cause of spontaneous combustion. I might give illustrations of these inquiries to show that, even up to within the last few months, it has been held by the magistrates and others, upon the advice of Inspectors of Mines, who have come forward to give evidence, that unless there is pyrites in coal, spontaneous combus-

tion is not likely to occur. Therefore, when I read Professor Lewes' paper, I was very much struck, not only with the theory he has advanced, but also with the able way in which he maintains it, namely, that spontaneous combustion is mainly attributable to chemical change, which is brought about by oxygen combining with the carbon and hydrogen of the coal, and that the presence of pyrites has little or nothing to do with it; and I do not think that any gentleman can have seen the chemical illustrations which have been shown us to-day without feeling very strongly convinced that that theory is a correct one. Quite apart, however, from this question, Professor Lewes is at variance with some of the precautions which have been taken, and which have been so strongly enforced of late years, with regard to the carriage of coal; I mean, more particularly, with reference to ventilation. The principle which has specially influenced the Courts on this point has been that "through" ventilation of the cargo is almost certain to produce spontaneous combustion, certainly where there is pyrites in the coal, and it may be so where coal has been so broken up in loading that it lies in a powdered condition at the bottom of the ship's hold. There have been various forms of this "through" ventilation, and Professor Lewes has pointed out the objection to them, and in doing so he is in accord with the recommendations of the Royal Commission, but I believe that, through the action of the Board of Trade, it has practically been stopped. As a matter of fact, however, recommendations with regard to spontaneous combustion or ventilation, even when made on such high authority, are not like regulations which can be enforced—you may point them out to ship-owners, but you cannot always be sure of their being observed. The great difficulty with regard to coal cargoes is that the danger does not lie solely in the spontaneous combustion, but coal is also liable to give off gases which may lead to explosion, and the remedy you apply to the one danger may very possibly conduce to the other. The Board of Trade have apparently been in this difficulty: they have been anxious to lay down instructions and make suggestions of a practical nature, but they have not chosen to take upon themselves the responsibility of defining precisely what the precautions should be, except as regards ventilation. Experience has shown, with regard to this, that vessels carrying large cargoes of coal are liable to gas evolving from the coal, not only while it is being put on board, but often for some time afterwards. To avoid risk of explosion, therefore, the Board have made special regulations to ensure "surface" ventilation, so as to get rid of gases which, if allowed to accumulate in the hold, would convert it into a sort of gasometer, so that, supposing the bulkheads are at all leaky, and there is a chance of gas passing through to a light or to a fire on the other side, an explosion would certainly follow. While, therefore, we have positive regulations with regard to surface ventilation, we have only the recommendations of the Royal Commission and suggestions by Courts of Inquiry as to spontaneous combustion, and although by the latter it is enjoined that care should be taken to avoid as far as possible breaking up the coal when it is put on board, and that the coal should be thoroughly screened and dry where liable to pyrites, and that when known to contain pyrites to any great extent it should not be used for shipping to foreign parts, yet none of these suggestions are embodied in positive regulations, so that the shippers pay attention to them or not, just as it suits their convenience. But there has been a practice with regard to surface ventilation which is rather interesting to notice, because I think that Professor Lewes' observations about the ready absorption of oxygen by coal has a special bearing upon it. It was only the other day that I was speaking to one of the Assessors, who is frequently employed on these inquiries, about the difference of opinion which exists as to keeping off the hatches at sea when coal is on board. According to the Board of Trade regulations, it is required that there shall be ventilation bollards at each end of the hold, so that the one at one end shall act as a down take for the air, and the one at the other an up take for foul air and gase, but the Assessor's opinion was that in fine weather the hatches should always be kept off as well, and his experience on several voyages round Cape Horn has been that, with one exception, he succeeded in accomplishing his voyage without his cargo firing. This sort of surface ventilation, however, has not proved in all cases to be so satisfactory, for, in some cases which I have noticed, it has been proved that where the hatches have been kept off for a considerable time, and there has

been bad weather, which necessitated their again being put on and battened down for a few days, there has soon been evidence of heating below. I have noticed that in a good many cases in which this course has been followed, the cargoes ignited from spontaneous combustion, and whether or no this was in consequence of taking off the hatches appears to me to be a matter for serious consideration. I am inclined to think, putting Professor Lewes' theory and that experience together, that battening down the hatches after leaving them off for a considerable time, and after the coal has probably absorbed oxygen, does conduce to spontaneous combustion, and, as a consequence, firing occurs. But there is another thing. Professor Lewes' idea is that you should keep the hold closed altogether; it seems to me, however, that this is a very impracticable idea, unless you carry out his suggestion of having air-tight bulkheads, and using carbon dioxide to cool the coal. But look at the way in which he proposes to use this carbon dioxide. It is to be used in small steel cylinders, the caps of which shall be fusible at a certain temperature. But is it practicable to get owners to see that these are placed throughout the cargo, as he suggests, at intervals of one for every ten tons of coal? I dare say, from the experiments we have seen—indeed, I think it is highly probable—that, if spontaneous combustion begins to develop, carbon dioxide would stop it, and the result would be exactly as the Professor points out. Still, I am not quite clear about the owners taking to this idea, because, without using the word "finicking" in an offensive sense, shipowners and the loaders of these coal cargoes, who have a rather rough and ready way of doing things, would look upon it as a finicking and an impractical thing which you wished them to do. I think, too, that, even with Professor Lewes' precautions, the effect of keeping the hatches on when the bulkheads are not gas-proof would very often lead to difficulties. It may be interesting for me to mention a case which illustrates Professor Lewes' observations about the tendency of the cargo to heat as the vessel gets towards Cape Horn. It is the case of the "Alpha," which came before the late Mr. Rothery, the Wreck Commissioner, in 1883, and from the report we get regular observations of the temperature of the ship's hold, and other useful particulars. It seems that, on the 3rd August, when she was in 2° N., the temperature in the fore and after holds was 84°, and in the main hold 90°. On 4th August, the next day, when they were ¾° N., the temperature of the main hold was 96°. On the 9th, they were 5¼° S., and the temperature in the main hold had increased from 96° to 109°. On the 30th it had gone back a little bit. They were in 30° S., and it was 104° in the main hold, a decrease of 5°. Up to this time all the openings had been securely fastened down, so as to prevent the entrance of atmospheric air, but on this day it was necessary to open the main hatchway to get at the anchors and cables, as they were nearing their destination. The hatch, however, was only kept off as short a time as possible, but the result was that on the same night the temperature had risen to 112°, and at midnight it was 120°. On 1st September, at 4 A.M., it had got to 132°, and at 5 A.M., an hour afterwards, to 150°. A hole was then cut in the hatchway, and water was poured through a funnel on to the coal; the heat, however, increased, so that by 11 o'clock it was 180°. The quantity of water poured down, which now stood at 5 feet 6 inches, began to tell, so that the temperature fell by 5 P.M. to 136°. At that time they anchored, and remained so until the 3rd of September, owing to bad weather. The temperature meanwhile showed signs of increasing. At 4 A.M. the main hatch and skylight were blown off, and two hours afterwards, the ship being on fire, the crew scuttled her. I think this is an illustration which shows that the further one gets into the tropics, the greater is the tendency of the cargo to ignite, presuming that the elements which conduce to spontaneous combustion have been set in operation in the coal. There is, however, another reason why I mention this particular case, and that is to draw a moral from it as to the use of water in quenching fire, when it has been started by spontaneous combustion. Now, it would seem that there is a very great difference of opinion as to whether water is or is not useful in such circumstances. In one particular case, in which the cargo was on fire, and the Captain ordered the crew to pour water into the hold, one of the men, who happened to have previously been on a burning ship, objected, and persuaded the other men that pouring water upon a burning cargo in that way was calculated to do more harm than good, and he, with the rest of the crew, declined

to do anything of the sort. The Officers, however, feeling the matter important, and believing, as the Captain did, that it was the proper course, set to work to pour down as much water as they could, with the result that in a very short time the fire had increased to such an extent that the crew were obliged to abandon the ship. Now it seems that opinions also differ as to whether water, to be efficacious, should be used in large or in small quantities. Courts of Inquiry, however, seem to have generally set their faces against the use of water in small quantities, believing that in that way it merely adds fuel to the fire. Professor Lewes' theory is that you should not use it at all in the upper part of the cargo, and I am inclined to think he is right, for, as you will have noticed in the case of the "Alpha," where there was a depth of over 5 feet of water over the cargo, the effect of even large quantities of water seems to be merely to keep any air temporarily from getting to the coal, but you do not stop heating or spontaneous combustion, and the only way to do so seems to be to sink the ship altogether. The experience in several cases which I have noticed has generally been as follows: smoke is noticed coming out of the ventilators or through the hatchways, the hatches are taken off, some of the coal is dug out in order to get as near to the fire as possible, and water is poured in until the men can stand by no longer, owing to the dense fumes. The hatches are then put on again, explosions occur, and flames break out in the course of a very short time. It may be that the water is turned into steam before it can get to the seat of the fire, and that steam causes the explosion; or it may be that gases are generated, which combine with the steam to cause explosion. Any way, it will be interesting to know from Professor Lewes what is the real explanation of the explosions which follow the use of water in these cases. Professor Lewes has a theory of running pipes along the flooring of the hold, so that the lower part of the cargo, where spontaneous ignition generally begins, may be quickly flooded, and I fancy that the idea has a good deal to recommend it. I am afraid I have occupied a great deal of time, but it is very difficult to concentrate one's remarks on this very wide subject, on which there are so many different theories. But I would like just to say, in conclusion, that, speaking for myself, I believe Professor Lewes has contributed new and very important information in the papers which he has laid before us, and I should be very sorry to see these papers simply relegated to the pages of the Journal of this Institution and get no further. I hope the Board of Trade will take up this matter, and see whether a Departmental Committee, assisted by experts, could not be appointed to consider whether the recommendations which the Royal Commission made some fifteen years ago, and the arrangements in force for carrying them out, are sufficient, under present circumstances. No doubt they have done very much towards saving life and property, but, considering that many lives and ships are still positively known to be lost from either spontaneous combustion or explosion, and that of the missing coal-laden ships there may be many more losses attributable to the same causes, it is quite possible that the precautions taken are not altogether what they might be. In conclusion, I would express my gratitude to Professor Lewes for the way in which he has interested us in this very important subject.

Admiral Boys: I wish to ask one question, and although it does not bear directly on the subject of this paper, viz., "Spontaneous Ignition in Coal Bunkers," it has been referred to by the lecturer. I should like to ask if the principle that Mr. Lewes has elucidated to us in respect to coal-bunkers is applicable to ships' magazines in keeping them at an even temperature, because in these days of forced draught and extreme heat in engine and boiler rooms, I do not think any nation has yet obtained a description of gunpowder that will remain in the magazines of ships, as at present arranged, without deteriorating, in consequence of the degree of heat and variation in temperature which those magazines have to undergo. It is a question which has been started in this theatre before; it is a most important one, and, perhaps, if Mr. Lewes has not already given his attention to the subject, he may take the opportunity at another time of doing so, and of advising us on the result.

Professor V. B. Lewes, in reply: Mr. Chairman and gentlemen, I will first, if you will allow me, refer to one or two points which Mr. Thomson alluded to in his excessively interesting comments upon the paper. The first point he brought

out was that pyrites is still universally taken as being the cause of spontaneous ignition. I think Mr. Thomson will agree with me that that arises a great deal from the fact that the coals are not analysed, and that nothing, therefore, is known of their composition. If coal-owners only had an analysis of the coals they put on board, and if coal-shippers insisted on having such an analysis, they then would know what was being done, and there would be some data to go upon. Pyrites has nothing to do with the case, and in most cases where spontaneous ignition has taken place pyrites were not present, although they were assumed to be present. In the next case, through ventilation of a coal cargo is an impossibility, and unless you have gas-tight bulkheads I do not for one moment advocate the closing up of coal cargoes. If you have only the ordinary bulkheads you find in one of the old coal-ships, then the Board of Trade recommendations are undoubtedly the very best that could have been made, because they give the surface ventilation which is necessary to get away the gas before it can get to the other parts of the ship, which is an important point; but if you have gas-tight bulkheads, then the ventilation of the surface is not necessary, and you can batten down and keep everything perfectly safe till the ship reaches her destination, and then you have only ordinary precautions to take. If you have leaky bulkheads you cannot do that, and then the Board of Trade regulations are the right regulations to follow, and you must have good surface ventilation. In the next place, as to gas being evolved; gas is given off chiefly during the first month, and taking off the hatches afterwards is of very little use. As has been pointed out by Mr. Thomson, there have been many cases in which the hatches have been taken off, simply because it was fine weather, and then are put on again because the weather begins to look a little dirty. If you ever take hatches off you must keep them off; if you take hatches off you allow air to go in, and allow the coal to take up oxygen, and then you shut it up snug and cosy for the chemical action to go on. If you take the hatches off you must keep them off, so as to let air in and keep down the temperature as much as it can, but putting them on after they have been taken off is an error. If you put water on the top of a mass of fuel which is incandescent at the bottom, you have the water percolating down gently, and, probably, never reaching the seat of combustion, but evaporating off and giving large volumes of steam, which, if the hold is battened down, might cause explosion, and which, in any case, would cause the formation of water-gas, which is a mixture of hydrogen and carbon monoxide, by contact with the incandescent fuel, and this gas mingling with the air would be a dangerous explosive mixture, and this is the cause of many explosions after you have put the water in and battened down. Now I come to Admiral Boys' question as to magazines, and in that question you have opened up a subject of the gravest import. There is no doubt, as I pointed out in the paper, that ships' magazines are of far too high a temperature for smokeless powder, indeed, with magazines as at present constructed in the new programme ships, it would be absolutely impossible to ever put smokeless powder into them, simply because you have the magazines down between the boilers, and you must have a temperature which the smokeless powder—the most delicate class of powder—could not possibly, under any conditions, stand. You must have something such as the double-lined bulkhead, which I have suggested, in order to keep these temperatures down. The Admiral knows better than I do the variations of temperature in sea-water, and he knows that they are not very great. It is a variation which powder, even smokeless, can perfectly well stand, and if you have a thorough sea-water casing to the magazine in the way I have suggested, with registering thermostats to keep you acquainted with the temperature, so as to know whether to increase the flow of water through the bulkheads or not, you can absolutely regulate the temperature of these magazines, so as to make it possible to keep these powders. With the E. × E. and the S.B.C. powders the same trouble exists, although to a smaller extent; in both of these powders you have about 2 per cent. of water, which is just as much part and parcel of the powder as saltpetre or sulphur, and if you keep these in over-heated magazines you slowly drive off some of the water, and alter the ballistics of the powders. The powders are most perfect: you can rely upon their ballistic so absolutely as to get within a few feet per second the rate at which the projectile will go, and within a few pounds of the pressure on the breech of the gun when they are in proper condition; but if you

put them into a hot magazine, do what you will, they must naturally lose moisture, and this goes on slowly, but the effect is very serious indeed. Supposing you take a powder with 1·7 per cent. of water in it, and supposing you keep that in a magazine until you have got rid of about 1 per cent. of that water, you will find the pressure in the gun go up nearly 25 per cent., and you must see that if you get, through heating the powder, an increase of pressure of this kind, it is a very serious extra strain on the gun. Therefore, I think, some suggestion, of the kind I have made, certainly ought to be taken into consideration, and something done to keep the magazines on board ship at an equal temperature. I have now only to apologize for the inordinate length of the paper, which I am afraid was rendered still longer by the experiments, and also to thank Mr. Thomson for the very many valuable points which he has brought out in the remarks which he made in the discussion.

The CHAIRMAN: I should like to make a remark with regard to explosions in coal-bunkers. I understand the lecturer to say they are frequent.

Professor LEWES: Not in Her Majesty's ships.

The CHAIRMAN: During my service it has only occurred once, and I have never known of any other explosion in coal-bunkers. It was when I was on board the "Minotaur," and took place in the year 1868 or 1869. It bears out exactly what the lecturer said as to that kind of thing occurring generally before the coal has been on board ten days or thereabouts. We were at Spithead taking in powder and shell preparatory to joining the Fleet at Portland. The powder hoy and the shell-lighter were alongside, and were about half cleared. The men were stowing the powder, when there was an alarm given of fire aft. I found the main deck full of smoke, coming out of the shell-room compartment. Of course it was a very anxious moment. I rushed down and found the men coming out of the shell-room looking very white. They told me the ship was on fire aft. I was going along the orlop deck, and just at that moment one of the bunker-lids blew off at my feet, and then I guessed what was the matter; but was very much surprised at the enormous amount of smoke which filled the ship, and which doubtless arose from an explosion in the coal-bunkers. That is the only case that I have known of, and, as I said, I was not aware that they were at all frequent. With regard to the magazine question, it really does not want boilers to make our magazines exceedingly hot. Anyone who has served on the East India Station will know the great difficulties we have to undergo there, even without the magazines being placed between the boilers. On board one ship we had to take the hatches off and put a wind-sail down hours before any men were allowed to go down. I hope that Mr. Thomson's suggestions as to appointing a Departmental Committee of the Board of Trade to go into the matter of fire in coal-laden ships will receive attention, and be taken up by the authorities. I am sure you will all join with me in giving our thanks to the lecturer for this most instructive paper, so well and ably illustrated by experiments. As far as the Navy is concerned, it will certainly be one of the most interesting lectures in this year's Journal.

# THE DEFENCE OF INDIA, AND ITS IMPERIAL ASPECT.

By Colonel Mark Sever Bell, V.C., Royal Engineers, A.D.C., Fellow, King's College, London.

"Qui veut la fin doit vouloir les moyens."

The ex-Viceroy of India, at the Guildhall, on the 29th May, 1889, spoke thus:—

> For I hold it to be an essential principle that under no conceivable circumstance would it be compatible, either with the good faith of the contracting Powers or the safety of the Empire, that the agreement come to by us with Russia, on behalf of the Amir, in regard to the northern boundary of Afghanistan should ever be modified or ignored (cheers). Any further approach of a great foreign military Power towards the confines of India would entail upon the latter country such an intolerable amount of expense in the shape of additional fortifications and other measures of defence as would become absolutely intolerable, and would be less preferable than any other alternative, however serious.

Diplomatists of the ability of the Marquis of Dufferin and Ava have reputations to lose, and cannot afford, either for their country's or their own sakes, to utter words such as the above without earnest premeditation and deep study. Lord Dufferin has most ably, in the above few words, laid down how India is to be defended, *i.e.*, through Afghanistan; and it is our self-imposed task to study here the means required to be taken to render the defence of the Afghan borders, that is, the Indian frontier, possible, and the power necessary for it.

War is an "art;" yet the dweller in England, methinks, in this year of grace, might well be led to question this undoubted truth, so glibly do those who pose to be the exponents of her *arcana* treat her most difficult problems. We have been led to this reflection by a confused reminiscence of several of the magazine articles that have appeared of late years, chiefly within the last three or four, on the defence of India, and propose here to do our best to popularize the problem, while still adhering to a consecutive course of reasoning as the only business-like manner of doing justice to such a weighty matter as the defence of what all deep students of history, thought, and progress must acknowledge to be the centre around which our Empire is framed; its centre of nervous sensibility, from which if severed paralysis of the whole body would result; for would not its occupation by a great military nation place in our very midst a Power capable of cutting Great Britain off from her Eastern Colonies and from her Eastern commerce, not only with those Colonies, but

also with the East at large? The Power capable of the occupation of India is certainly able to cripple Britain eventually in the East.

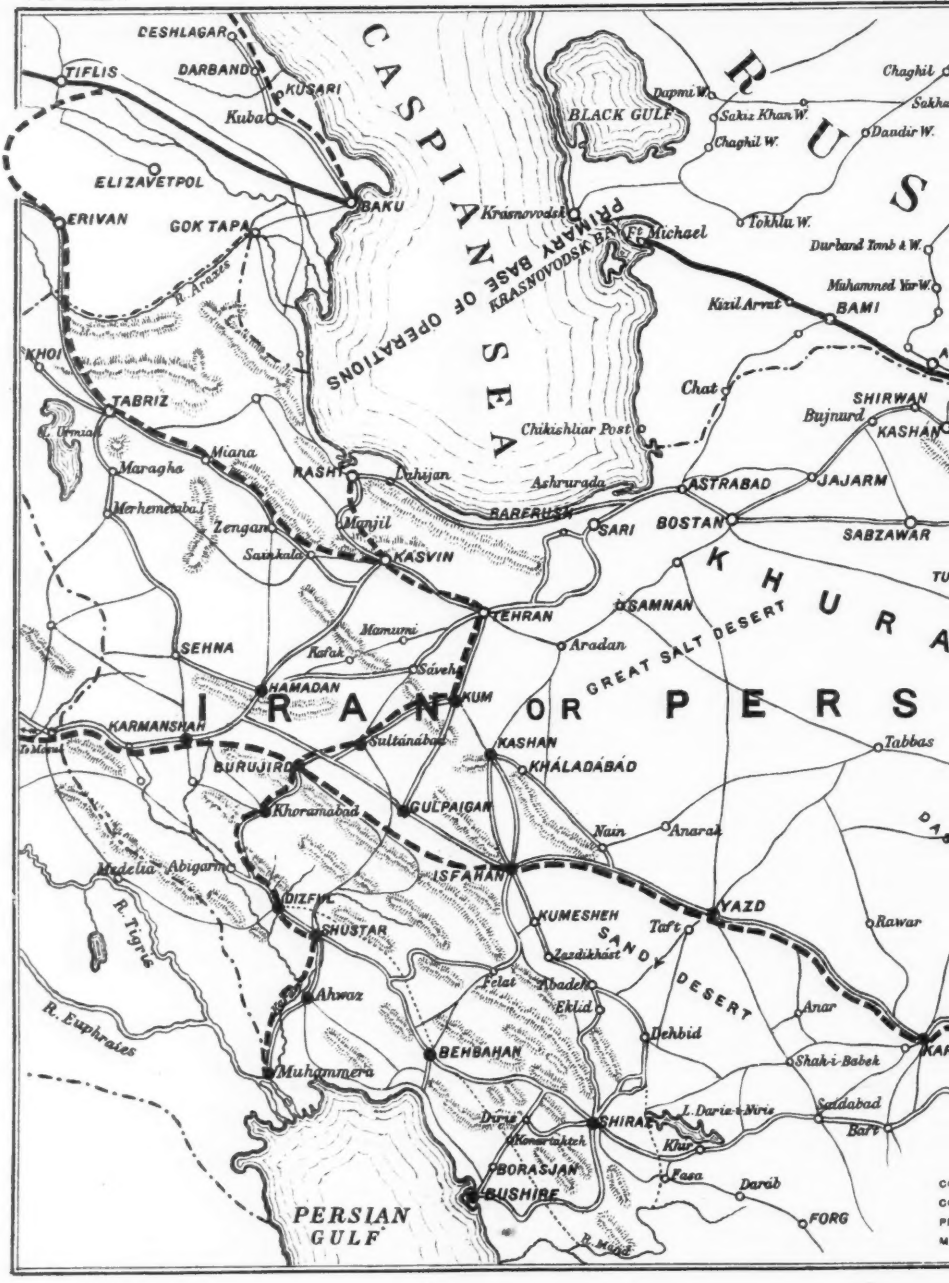
We are encouraged also in this attempt to popularize the subject by the thought that it is now of some importance to thus discuss the problem, because our representatives in Parliament are apt to accept the untaught opinion of the irresponsible multitude as a divine oracle, and to force the Ministers selected as the exponents of their views into the false position of being governed by uneducated opinion, instead of giving them that support which men in their difficult position are entitled to.

The hopeless conflict of opinion that exists as to the defence of India renders it advisable that a well-considered continuous policy of action should become a popular demand.

Having determined what is most desirable we are none the less likely to gain what is attainable; and we hold that "the desirable" should be the object of our aims, and not its limits, "the attainable," which must vary from time to time.

We will commence with the assertion that the defence of Afghanistan is the defence of India, and then proceed to explain our reasons for making it, and which are based upon the consideration that she is the custodian of the covered way of India's enceinte, an outwork vital to her safety, and which her deepest interests require should be garrisoned and defended by her best and most loyal troops. As it is easy to say "We think so and so," but not so easy to satisfy others that our conclusions are right, we will, in endeavouring to lucidly prove this assertion, confine ourselves to facts and to those military principles which, having been derived from experience in war by those who have been its greatest masters, are equivalent to facts, and, from teachings drawn from history, facts also, for history repeats itself, and in the East is rapidly repeating itself in the reformation and reorganization of the Empires of Chengiz Khan and the Moguls. And as all just-minded people must also be of opinion that that race is a degenerate one which allows personal views and notions of present ease and peace to have any weight whatever in the solution of a problem of the greatest importance to posterity, and which must be solved by us to *their* best advantage, and not *our own*, if we desire that they should inherit our birthright; that our daughters should not upbraid us as the authors of the unjustifiable slaughter of their sons in the unequal struggle which we will by our turpitude have imposed upon them; and, if we have yet sufficient nobleness left to us not to barter away our inheritance for the imaginary advantages of living in the most dangerous fascination of a fool's paradise of peace, we put forward here what study teaches us to be necessary for the security of the Indian Empire against encroachments—till such time as Russia may have absorbed China—for not till then will we acknowledge that our position in India (with the Hindu Kush as a frontier) is an untenable one, or one which, if conducted on right principles, is beyond our strength.

We have not a word to say to those who, because of the difficulties of the task and the power of the rival, would submit to what they


CASPIAN SEA
RUS
PRIMARY BASE OF OPERATIONS
KRASNOVODSK BAY
BLACK GULF
Krasnovodsk
Ft. Michael
Dagmi W.
Chaghil
Sakiz Khan W.
Chaghil W.
Dandir W.
Tokklu W.
Durband Tomb & W.
Muhammed Yar W.
KESHLAGAR
TIFLIS
DARBAND
KUSARI
Kuba
ELIZAVETPOL
BAKU
ERIVAN
GOK TAPA
R. Araxes
KHOI
TABRIZ
Urmiah
Maragha
Miana
Merhemetabad
Zengan
Sainkala
KASHT
Lahijan
Manjil
KASVIN
Kizil Arvat
BAMI
Chat
Chikishlar Post
SHIRWAN
Bujnurd
KASHAN
Ashrurada
ASTRABAD
JAJARM
RABERUSH
SARI
BOSTAN
SABZAWAR
KHURA
TU
SAMNAN
TEHRAN
Aradan
GREAT SALT DESERT
Mamuni
Kafak
Sávch
SEHNA
HAMADAN
KUM
IRAN OR PERS
KARMANSHAH
Sultánabad
KASHAN
KHALADABAD
Tabbas
BURUJIRD
Khoramabad
GULPAIGAN
Nain
Anarak
Medelia
Abigarm
ISFAHAN
DIZFUL
SHUSTAR
R. Tigris
KUMESHEH
YAZD
Taft
Rawar
Zezdikhast
SANDY DESERT
Felat
Abadeh
Eklid
Ahwaz
Anar
Dehbid
R. Euphrates
BEHBAHAN
Muhammera
Shah-i-Babek
Saidabad
Bafk
Dorie
SHIRAZ
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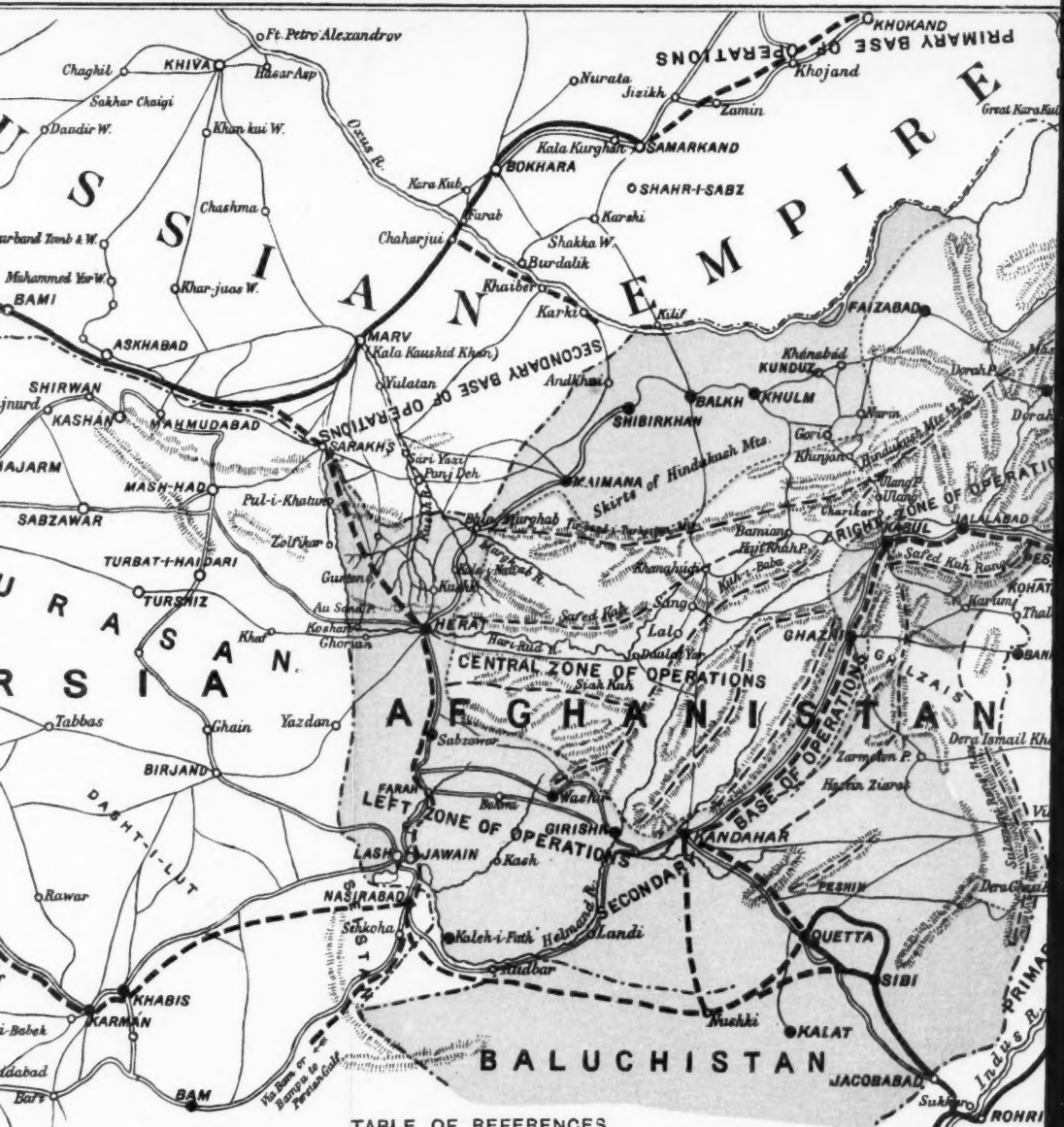
Mamarahtch
BORASJAN
Fasa
Darab
BUSHIRE
PERSIAN GULF
FORG
R. Mand




## TABLE OF REFERENCES.

COUNTRY FAVOURABLE TO WELL OFFICERED IRREGULAR TROOPS AND A WAR OF MINOR OPERATIONS.

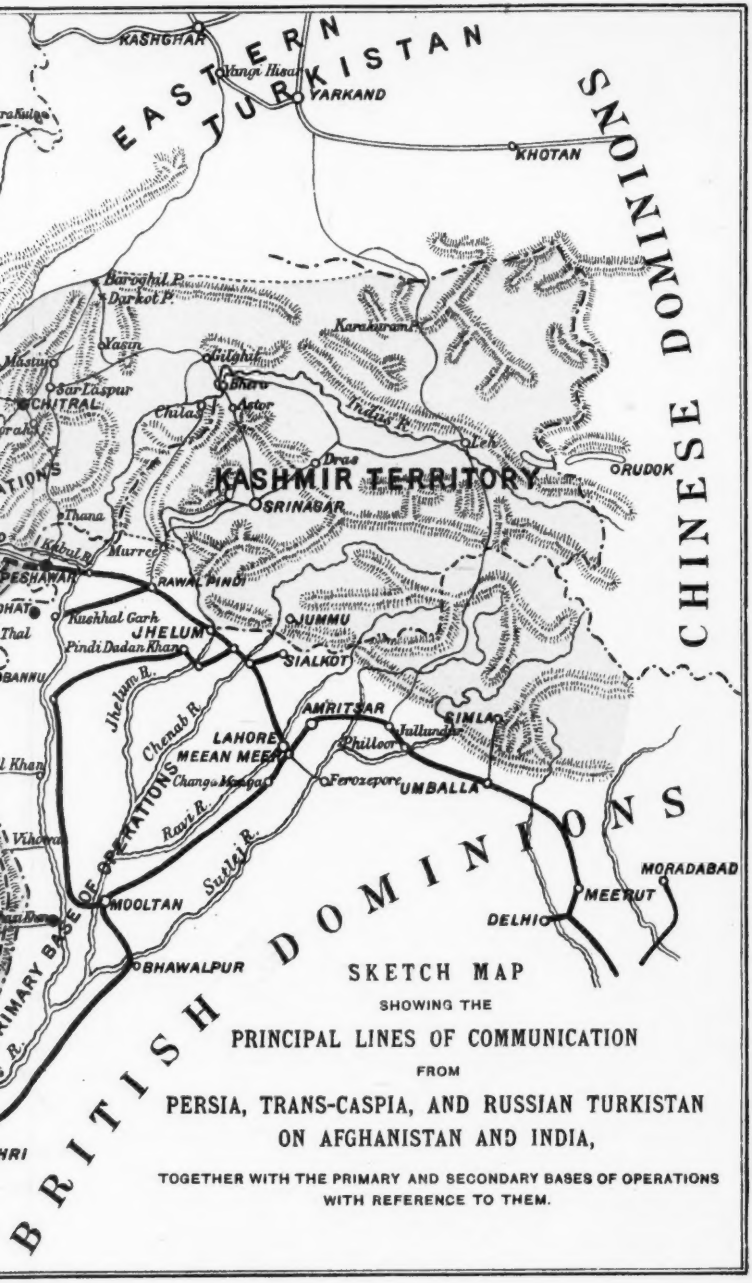
COUNTRY FAVOURABLE TO REGULAR TROOPS AND GENERAL ENGAGEMENTS.

PROPOSED RAILWAYS — CENTRES OF SUPPLY. — MAIN LINES OF COMMUNICATION.

MAIN WATERSHED LINES

HARRISON & SONS, LITH. ST. MARTINS LANE, W.C.


HARRISON & SONS, LITH. ST. MARTIN'S LANE, W.C.




SKETCH MAP

SHOWING THE

PRINCIPAL LINES OF COMMUNICATION

FROM

PERSIA, TRANS-CASPIA, AND RUSSIAN TURKISTAN

ON AFGHANISTAN AND INDIA,

TOGETHER WITH THE PRIMARY AND SECONDARY BASES OF OPERATIONS WITH REFERENCE TO THEM.

consider to be the inevitable, viz., "effacement in the East," without an effort to help themselves. By the aid of such men Britain did not become an Empire, and by following their advice she certainly will not remain one, and she should tell all such to transfer their allegiance from her Boreas-swept isles to those of the lotos lands of the Southern seas, far from Celt, Scot, Norse, and Saxon.

If the principles upon which these conceived necessities, desirable for security, are founded are true, they, as deductions from them, must stand to be as true as anything drawn from principles can be, and to be as near to a right mathematical demonstration of the problem as possible. Our Eastern policy should be active, uniform, and intelligent, based on study and knowledge; neither a vacillating nor a hand-folded one waiting on events, unless our minds are made up to be controlled by, and not to control, them. Disintegration by apathy is now possible, but not from want of knowledge. We are a mighty and wealthy nation, entitled to pride of place, and to secure for our posterity what we have ourselves inherited. Let us study how best to do so, for, with regard to her Indian possessions, Britain has now carefully to consider how, with the least expenditure of money and means, she can counteract a rival's menace from Trans-Caspia and Turkistan, and how strengthen her own position so as to be able calmly to contemplate any attempts from these bases to influence her policy in Europe, and her relations with her neighbours in Asia—Turkey and Persia.

Described in a few words, Afghanistan, including in that term for convenience sake the independent N.W. Frontier tribes, is a country of mountains, inclosing valleys and plains at high elevations, from the borders of India to the Hindu Kush and the Taimani Hills, beyond which lie the glaçis plains of Afghan Turkistan and of the Herat Province and the Helmand plains. Its Oxus provinces are mountainous. The Afghans chiefly occupy that portion of this region lying beyond the girdle of the N.W. Frontier independent tribes; her outer plains and Oxus provinces are held by tributary races, who make no secret of their hatred of their truculent masters, and who would prefer to be subject to the devil himself.

The mountainous part of such a country is the battlefield sought by a people in arms, to which an Afghan force must be likened, too weak and too ill-trained to accept battle in the open with an enemy having superior numbers and training; for mountains are barriers to the progress of numbers, crossed by tracks at but unfrequent intervals, and these open to the attack of mobile irregular troops, *if well officered*. Such bodies can here offer a comparatively formidable resistance. An enemy dare not enter such a region without caution, or advance through it without preparation, thereby giving its defenders time to organize a resistance to the rear and to both or either flank. Mobility, however, is with the attacker and stronger side, and immobility tells against the defence to such a degree that it must yield ground; for although each portion of the army on the defensive is stronger, the whole is weaker, and although in minor operations hills are an element of increased strength to the defence, yet such a war of cordons is favourable to the resolute attack. But if

the defenders, although they be but partizan troops, be sufficiently well trained and officered to act as a mobile field army, and the hill posts be well chosen to enable it to pivot on them, then we can conceive that they can take the offensive, and advantageously meet the attack with its own weapon of superiority; in other words, in order to counteract the advantages that mobility gives to the attack in a decisive battle, it is necessary that the defending army and the natural difficulties of ground should be capable of making common cause. From this we conclude that such citizen troops as the Afghans, in order that they may be able to take advantage of the physical difficulties of their country, require the aid of a nucleus of trained soldiery, such as our Anglo-Indian Army, to give them confidence and a leaven of intelligence sufficient to enable them to do so.

Operations in the hills, nevertheless, are not preferred by the offensive, because of the difficulties of supporting war in them, the difficulties of routes, the uncertainty of the enemy's plans, &c.

The accompanying map of Afghanistan is coloured to show what country is favourable to a war of minor operations, such as may be carried out by irregular troops, officered by British Officers and supported by a nucleus of trained troops, and what is favourable to regular troops and general engagements.

We have arrived now at the conclusion that hill warfare is complicated, and requires that the troops engaged in it should have both training and mobility, and that irregular troops, such as the Afghan Army, badly officered, would be quite incapable of waging it with any chance of success against superior troops and numbers, although eminently fitted for it in some ways.

In the border plains of Afghan Turkistan, and in the Herat Province and the Helmand plains, the case of such troops is worse, and semi-trained levies could not hope to resist one-third their numbers of trained European troops.

It has already been stated that the inhabitants of these plains are inimical to the Afghans. Let us now consider how this vulnerability of Afghanistan to Russia affects the defence of India.

As the mountainous section of Afghanistan lies westward of the range of hills bordering the right bank of the Indus, it becomes in the first instance necessary to consider the principles that should regulate the defence of the Indus plains stretching from Peshawar to Karachi, and covered by it. To defend such plains, thus flanked by mountains towards a possible enemy's country, it is necessary:—

1. To see beyond the hills, for without such sight you cannot act decisively, but must grope blindly in the dark.
2. To hold the mouths of the passes.
3. To hold defensive posts and positions (main valleys) within the hills, barring the passages through them.
4. To hold defensive positions in the plains to their rear, to prevent all egress from them.

In hilly regions the valleys are held by armies, for they command the hills, and it is there that they must be mainly defended.

The above well-established principles compel the conclusion that

the Indus plains must be defended actively against any trained bodies through Afghanistan; otherwise we are forced to confine our defence to the fourth principle enunciated above, *i.e.*, to the mouths of the passes actually opening out on to the Indus, a defence hitherto good enough against Afghanistan, but only possible against a trained foe of superior numbers with numbers at least equal to what the enemy can bring against us, and to attempt which means the financial ruin of India, and the consequent discontent of its peoples. The relinquishment of the first three *desiderata* thus not only involves the financial ruin of India, but gives them over to the enemy, who by them gains all the issues leading from Afghanistan into India, with the exception of their mouths.

It may be argued that the flank position that we have taken up on the Peshin plateau checkmates this gain. It would do so were we, as we have hitherto been, the stronger military Power; but with Russia in possession of Afghanistan, we being the weaker, it is our position that is outflanked, and we must, in consequence, retire out of it so soon as the enemy should have established himself in what we have relinquished and shall have opened communications with the Oxus and Trans-Caspia.

It is an axiom that war must be preceded by preparation for war, and that no campaign can be carried on against a great military Power without strategical railways and well-constituted and conceived lines of communication to supplement them.

Such preparations are required throughout the whole Afghan theatre to fit it to our advantage for a possible theatre of war; and, what are we doing to this end? Little beyond preparing to hold the mouths of the passes debouching on the Indus, and in so doing preparing our own financial ruin, and digging, perhaps, our own graves, certainly those of our sons, instead of increasing our prosperity by opening up trade and routes in Afghanistan, and thus civilizing our neighbour: our bounden duty irrespective of all selfish considerations. The fault is not ours but the Amir's, and we will return to this consideration hereafter, but let us now keep to principles, and first consider the approved conditions regulating the employment of fortifications for strategic purposes, in order to get a clear idea of what is desirable should we at any time determine to defend India through Afghanistan. As all well know, it is chiefly the nature of the ground that regulates these conditions. The first in order towards the enemy are fortified posts confined to the important roads, and required to block defiles, to close their mouths, and to furnish information. And in main support to these, fortified magazines and depôts, defended by a field army, and having within their spheres of action entrenched positions suited to the numbers of the field army, and prepared as battlefields, *i.e.*, positions, both naturally fit, suited to offensive-defensive tactics, and such as shall require a force that may have passed through the zone defended by irregular troops to attack them. The flag follows trade and the great geographical features of the country, and such positions for depôts and magazines naturally depend on the permanent nature of the geography

of the country and on cultivation, and have already been determined and exist in the sites of the great centres of habitation and commerce, such as Kabul, Ghazni, Kandahar, Farah, Balkh, and Herat, &c.

It is essential that these points be held (by troops, not necessarily by fortifications), because necessary to the organization of field armies, their administration, and maintenance. In conjunction with them it is necessary to hold those points on the lines: (1) Peshawar—Kabul—Bamian; (2) Kohat—Ghazni; (3) Kabul—Ghazni—Kandahar; (4) Ghazni on Banu and Dera Ismail Khan; (5) Quetta—Kandahar—Farah—Herat; (6) Nushki—Sistan, the occupation of which would influence their use for considerable distances, *i.e.*, the defiles on them, or giving access to them, and points necessary to hold in case of a retreat. Certainly the main positions must be so dominated from the mouths of the roads or passes leading to them and by railway connections with them that their occupation may be possible on the necessity to do so arising.

On the map the depôts are represented by black circles, and the main lines of communications by double lines.

Bearing these principles in mind, we are now in a position to consider Afghanistan as a whole as a theatre of operations. Looking at the map, treated as already described, it will be seen by my military readers that, as a theatre of operations, it affords an excellent example of an offensive-defensive position; its right and centre constituting the defensive, and the left the offensive, zone; the first covered by mountains and difficult to assail; the second comparatively open and opposing no natural geographical features of country as obstacles to movements or difficulties of supply to the active operations of an army that cannot be overcome by railroads. The right zone is favourable to an offensive counterstroke, and the left well situated for the concentration of the forces of the Empire, whether from Europe or the furthest points of India. The most southern line of this zone, Nushki to Sistan, if prepared, is most eminently favourable, as its attractive force must draw the enemy's advance over a desert country, and by the longest route, and over one which, if the matter were optional, would never be selected by him as a line of advance at all. The line Balkh—Kabul is a very natural line for a Russian advance to take because it leads to the capital and centre of resistance of Afghanistan, by the most direct road. We are aware that there are not many who share this opinion with us, but those who do have formed it from study, and this encourages us to think that it is a correct one.

The line Herat—Farah—Kandahar, in the offensive zone, is also a favourable line for the enemy to choose, conjointly with the above, as it presents no physical difficulties, passes through fairly fertile districts, and from it subsidiary intrigues, enterprises, and surprises can be carried out.

A glance at the map already referred to will show that the central zone, fronted by a deep belt of mountains, is difficult of attack from the west, but that the mountainous northern zone is vulnerable at several important points which threaten its main line of communica-

tion within Indian limits, and which, however, as well, allow of forces from India threatening, as already stated, a very vulnerable part of Russian Turkistan *i.e.*, the line Samarkand—Marjilan. The possibilities of invading India through this zone have been too lightly put aside; as already stated, it is a natural one for an enemy to select on account of its shortness, supplies, and objective (Kabul); its Indian outlet, Peshawar, is now connected by rail with Karachi and Calcutta. It will not suffice that we hold this exit—this head of the passes alone, even in conjunction with Lundi Kotal as an outpost; we must here also see beyond the passes which reach to the Hindu Kush range, and to this end a railway to Kabul is an imperative necessity.

Although very difficult, yet the hill roads leading through the centre zone must be observed, as by them surprises may be attempted. Their chief *point d'appui*, Ghazni, requires to be connected by good roads with its points of support, Banu and Dera Ismail Khan.

Old map-makers and travellers have so often exaggerated the difficulties of mountainous regions that, doubtless, when we become better acquainted with the Hindu Kush and its spurs, and the mountains westward of Ghazni and Kandahar, we shall find their difficulties to have been over-estimated, and such as will disappear rapidly before sapper and pioneer labour, even to the extent of their becoming easy to mules at the rate of eight miles a day, and passable to carts as leisure and opportunity offer.

Let us now consider how the Asiatic character bears upon the defence of India.

In all dealings with Asiatics those common-sense guiding principles which, from long experience, we have learnt to be necessary must never be deviated from; of these the following are the chief:—

(1.) To trust to those only who have shown themselves worthy of trust.

(2.) To arm those only whom we are in a position to control to our service.

(3.) Not to treat as trusty allies those who have ever held aloof from our friendship.

(4.) To mistrust the power of an undisciplined, half-trained, Oriental militia, under its own worse-trained and apathetic Officers, to withstand a trained soldiery in a scientific warfare.

(5.) To acknowledge that Christianity and civilization cannot recede before Muslimism and barbarism, or be kept stationary by it.

To act contrary to the above (an error we are so apt to commit from morbid notions of philanthropy, and the first three of which we violate daily) but causes Oriental nations to become puffed up with a baseless idea of importance and strength, and would appear to be senseless; but rather would it seem to be good sense to first discipline, to obedience and into confidence, those whom we desire to arm and trust, and then by their judicious enrolment as mer-

cenaries to give employment to their most restless and martial spirits, and so turn their fighting power thus controlled to our own uses.

From the foregoing as guides, all received and well-established military and common-sense principles, we may now summarize our conclusions thus far to be that:—To defend the Indus plains we must see beyond the mountainous section of Afghanistan into the glaçis plains beyond; that is, we must be prepared to defend Afghanistan, as the defence of the Indus plains rely for their protection upon it, and to do so it is necessary that (1) the irregular Afghan troops, properly officered, should hold the mountainous region extending from the line Girishk—Washir—Farah, north and north-east, to the line Maimana—Khalm—Khunduz—Fyzabad, including posts in Afghan Turkistan fronting the Hindu Kush, *i.e.*, the defensive zone of the theatre, having as their reserves at Kabul, Ghazni, and Kandahar, or the selected positions of which they are the centres, the regular Anglo-Indian troops, ready to meet the enemy in a general engagement on his emerging from the passes; and that the main army of Anglo-Indian troops should operate vigorously on the line Quetta—Farah—Herat, in its offensive zone.

No fortifications *en l'air* in the Hindu Kush are dreamed of. All that is required can be erected by the troops pushed forward into and beyond the passes. No troops are pushed forward beyond power of support.

The ruling idea upon which the above plan of campaign is based is that the Afghans are heartily willing that a British force should co-operate with them in the defence of their country. We are committed to this policy, and must give it a fair trial.

That this idea is one that will stand the test of events, many—and we amongst them—will gainsay; whether or not, that a barbarous Power, possessing a fanatical religion, can stand between two civilizing agencies is against both the laws of humanity and the teachings of history.

Granted, now, that the idea is a baseless one, and that the Afghans, unaided by British Officers and British troops, lose ground without even offering a moderate resistance to a better-trained foe, and it becomes clear that the British and Afghan Powers cannot act together harmoniously, either dependently or independently, it will then be necessary for the British Power to take such measures as shall enable its troops to push into the hills enveloping the right or northern and central zones of the theatre, and, so soon as material advantages are gained in the southern zone, towards Herat, to take the initiative, should numbers permit, beyond the Hindu Kush, or, at least, occupy the mouths of the passes and *threaten* the Turkistan base of the Russian forces in Central Asia.

The possibility of this action becoming necessary becomes a certainty when we consider that this is that part of Afghanistan the inhabitants of which are least under Afghan yoke, and who would be least inclined to allow to their hated masters, in their necessity, free movement through their hills, or to aid them by transport and supplies. The idea, then, that the Afghans can carry on, in this region, an

effective partizan warfare must be set on one side. *There remains but one alternative—we must do it ourselves.*

No war with a sincerely friendly Power is desirable; all that is insisted upon is based upon the instinct of self-preservation, which is strong in us all, and amounts to this, that, *nolens volens*, Afghanistan must be administered to both her own and our advantage; and, also, it is necessary that we should occupy, on occasion requiring, certain military positions, even at the risk of having to use such pressure as shall force her to bow to our will and, unwillingly, to benefit herself, by allowing us to push our trade routes and railways through her country. To help the Amir, the proposals made are necessary, and to help ourselves in spite of him they are necessary.

We have yet to consider the contingency that the Afghans may join Russia, being induced to do so by fear of her as the stronger military Power, by intrigue, promises, want of faith in our ability to help her, or other causes, and that India by this defection of her quasi ally may be forced to meet an invasion along her whole N.W. frontier. The defence of India conducted on the principles already enumerated meets this alarming and not impossible contingency, and therefore one to be guarded against. A reliance on a disunited people, of a proverbially Punic faith, the acceptance of Afghanistan as the arbiter of the security of India, affords but a poor relief from anxiety, and recurrent panics must be expected from a dependence on it. There would appear to be no solution of the problem of the defence of India that can be considered at all satisfactory, which is not free of such reliance on Afghan faith or on opinions of Afghan unity; or which cannot undo when necessary the evils of such a dependence at no great and prohibitive cost.

The plan of campaign as here sketched requires for its efficient prosecution railways as below:—

(1.) Peshawar to Kabul.

(2.) The extension of the Indus—Bolan line, viâ Nashki and south of the Helmand (through Baluch Territory), to Sistan; with branch lines—

{ to Kandahar and Kabul,
{ Farah and Herat.

(3.) A direct military line from Chaman to Kandahar.

(4.) And perhaps eventually a southern extension from Sistan through Bam or Bampur to the Persian Gulf.

Sistan, at the bend of the Helmand, is the one large oasis between Khurasan and the Gulf; the others to the south of it are of less importance. It is the watch tower of Baluchistan and Khurasan.

The above lines are fortunately of paramount commercial importance to us, and necessary to the civilization and development of both Afghanistan and Baluchistan, which we, as their Mentor, are bound to effect, whilst the Sistan line forms an important link in the overland railway eventually to traverse Mid-Persia and Mesopotamia. When the cost of two to three thousand miles of strategical and commercial railways is weighed in the balance against the security and prosperity of an empire, its effect on the scales is ridiculously insignificant, even when

there is added to it the difficulties of acquiring the concessions necessary to construct the mileage running through Afghan territory.

The line to Sistan is taken south of the Helmand to escape the drainage from the Afghan hills, to place the river between it and the hill tribesmen to the north, and to develop Baluchistan. The line north of the Helmand, except for these considerations, is to be preferred because more direct.

The great auxiliary strength of strategic railways to the military power of a State would seem not to have been grasped by the nation, or money would be more freely spent upon them and less freely on expensive wars leading to no results, and on pack transport suited only to minor operations, short lines of communication, and well supplied countries. In some cases the objects of a war can be peacefully gained by the construction of a railway. The question of ascendency at Herat, for instance, has ever been one of railways rather than men, and yet even in this, in what may be termed her own peculiar *forte*, prosperous, thickly populated, and commercial India has been out-distanced by sparsely populated and bankrupt Russia. Every colony of the Empire has surpassed her in pioneer railway enterprise.

Lord Strathnairn was of opinion that it was better to have 10,000 men with perfect transport, which insures their efficiency, than double the number with imperfect transport and all the evils that follow in its train—an embarrassed strategy, neglected sick, and an ill-supplied soldiery. Full of wisdom as are these words, they have as yet borne little fruit in so far as the question of the great strategical lines of communication are concerned: whilst forming a nucleus of minor transport, we neglect many important major transport considerations. A people is ill served by and will have a just cause of complaint against its advisers, if, from short-sighted views of economy, they advocate the construction of solely commercial lines of minor importance in preference to the, perhaps, less immediately remunerative but more important commercial and strategic lines, because necessary to security and the maintenance of peace and Empire. India's answer to the iron-enveloping band which has tightened around her from the Caspian to Samarkand should be the construction of a counter parallel iron road reaching from Quetta to Sistan, and thence eventually to Ispahan, Burujird, and Mosul, with feeding lines running northwards and southwards towards Russia's commercial bases and our own, "the sea," for the coming strife in the East is a commercial as well as military one. Wherever we try to tap the commercial resources of Mid and North Persia and to reach the Iranian plateau, we are met by difficulties of long road communication, suited to pack transport only, 600 to 1,000 miles in length. This barbarous means of communication requires to be altered, otherwise great commercial power, and the military one of "menace" is lost, and the difficulties of the enterprise overcome, except perhaps in the minds of the sanguine and determined few, all other considerations. Modern armies cannot filter along roads suited to pack transport only. The line of railway advocated forms the secondary base,

the breathing stage whence to prosecute further enterprises: by its aid and that of its southern feeders alone such operations become possible and easy; without them they are immeasurably more difficult, if not altogether impossible. The important strategic areas defending this line are dominated by the naval Power holding the Gulf, and backed by the resources of an Empire. The very great, nay immense, imperial importance of such a line, should overcome all difficulties, political as well as monetary and topographical, that may be met with in its inception and construction.

At a time when many may be thinking only of the railway lines required cis-Indus, it is well to remark that trans-frontier lines are the more urgently required, and that without them the home Indian lines but give rise in the mind of the nation to a false security for which there is no guarantee beyond a vague and plausible, but erroneous idea, that it ought to be the proper thing to sit at home and await events, and even fight there if necessary.

We have seen that India must be defended through Afghanistan; let us now consider the extent to which operations should be pushed. This is best determined by considering what effect will result from the restriction of its operations to any particular line, and what the loss of the corresponding amount of territory will involve.

In each case, that part of Afghanistan not occupied by the British is considered to be held by Russia, and when Afghanistan is mentioned, in it are included as before, for convenience sake, the tribes of the Suleiman range and our frontier border. With Afghanistan as a friendly independent Power and bulwark, India needs no defence, and the case in which it ceases to be such is alone here considered, *i.e.*, when it is wholly or in part occupied by, or is in alliance with, Russia.

The first case to be considered is naturally the defence exterior to Afghanistan, *i.e.*, the passive defence behind the Indus frontier range. It is argued by many that this defence is the least costly that (ii.) it requires no vast preparation of transport, and that (iii.) our railways enable us to meet amidst our resources an enemy who has advanced a long distance from his. All illusory advantages, it seems to us. As to cost, that defence which promises the greatest security is the cheapest. We acknowledge that Afghanistan is a present and temporary buffer to India, but for reasons already given we must conclude, as before, that it soon ceases to be such, and that an Empire cannot afford to gamble in cheap markets, or to effect its chief insurance in an office of straw such as the Afghan nation most assuredly is, but must be its own insurer; moreover, history teaches us that an active, self-reliant defence is the best. As it is contemplated to operate actively by railways, the difficulties of transport are discounted. Pushing railways in the wake of the army of occupation would enable us still to operate amidst our resources, and indeed increase them, supplies being drawn to the iron roads from all sides and an enlarged area, and massed to the front. The case of an enemy operating through Afghanistan from its primary bases of Turkistan and the Caspian and its secondary base the Caspian—Samarkand railway, as

already stated, is not here in question, for in considering the passive defence of the Indus, we must allow that Russia has been permitted to acquire what we have not endeavoured to defend, *i.e.*, two or more of the four main provinces of Afghanistan, and that she shall have been allowed to consolidate her power, and to push her railways through them, say, to the foot of the Hindu Kush and to the Helmand, and to open roads over the Hindu Kush and through the Paropamisus range, the Kuh-i-Baba and its difficult branches of the Tir-band-i-Turkistan to the north, the Safed Kuh in the centre, and the Siah Kuh to the south, and in such manner to have overcome all initial difficulties of food, transport, and communications.

With the opportunity thus afforded him to organize his communications, the invader will also operate amidst his own resources, increased by the acquisition of fertile valleys growing corn and barley, and rolling grassy downs, the home of nomad races, food-producing for both man and beast, the sinews of war. On which side will advantage then lie?

The very clearly apparent disadvantages of this line are:—(1) the large front on which the enemy can perplex the defence, and that (2) a reverse throws us back upon India. With reference to the first of these grave disadvantages, perplexity and scattered forces behind a veil of mountains are on the side of the defence, and certainty of purpose, power to make feints, and concentration of action on that of the attack; and as regards the second, General Jacob thus wrote in 1856:—

"A war *within* our own territory might be ruinous to our reputation and might entirely undermine our strength, although that strength might have sufficed to meet a world in arms *beyond* our own boundary. The evils even of successful wars are terrible, and such evils are undoubtedly most severely felt, are most intolerable in fact, in those countries the *most* accustomed to regular civilization and uniform, undeviating routine of civil administration. A severe struggle *within* our established and long settled limits with a powerful invader, although attended with immediate success to us, might shake our power in India to its very foundation; might certainly for a time overturn all our civil arrangements, destroy our revenue, and render it necessary to maintain large armies in the field in the interior of our dominions for a protracted period, in order to restore that internal tranquillity which might not be *in the least disturbed*, even by many battles fought beyond our frontier."

Those who think that it is possible to take up a defensive line behind the Indus trust much to the difficulties of the Suleiman range, and its prolongations, fronting the frontier from Peshawar to Karachi; these difficulties are confined to a narrow belt of hills, and to the west of them lie elevated valleys and plateaux affording good manœuvring grounds, fair pasture land, and fertile valleys, and they may perhaps forget that war will overcome the difficulties of its selected theatre, and suit it to its needs. The crests of the passes will fall to the enemy, who will see without being seen, and behind an impenetrable screen make his preparations.

To imagine that a mountain frontier can be defended by positions in rear of it alone, and to think that because you can see nothing that therefore nothing is to be seen worth seeing, are, it is maintained,

thoughts equally vain and erroneous, and that to seriously entertain and act upon them is to enact the height of folly and to display the utmost recklessness. Let all who think that a frontier line bristling with even a double row of fortresses is impregnable call to mind the history of the campaign of 1814, and ask themselves whether the numerous forts held by Napoleon's troops on the Rhine and the Mozelle hindered the capitulation of Paris or even delayed it, notwithstanding that they were backed by a field army of 70,000 men under the most able of commanders operating in a theatre which gave full scope to his superior military genius.

The second case to be considered is the passive defence behind the Suleiman range, with the left pushed forward into Peshin. This, as in the case just considered, assumes the existence of entrenched camps at Peshawar, Thal or Banu, Dera Ismail Khan, Sukkur, Quetta, &c., closing the mouths of the principal passes, and covering the Indus bridges.

A passive war of cordons and posts, such as indicated by these camps, can never be successful: as *points d'appui* in a first line to aid the initiative; as a final line behind which to gather strength, and take breath previous to an onward movement; to secure depôts, &c., &c., they are good. As a refuge in which the weaker may prolong his defence till a friend come to his aid,[1] they are also good. To trust to them as a first line of defence, instead of a last refuge, would be to waste energy and strength, and by the moral weakness of inaction, to sap the spirit of the defence. Again, we would ask, did the forts of Belgium, or France, or Germany, ever prevent an enemy from overrunning the soil they were designed to protect? The experience of the last Franco-German War needs to be borne in mind. With Russia in possession of the rest of Afghanistan, the advanced position in Peshin held on the defensive is untenable; outflanked, its communication with India can be cut far to the rear, and at the outset of hostilities the force occupying it (because presumably the weaker or the major portion of Afghanistan would not have been relinquished) must retire out of it, or shut itself up in the entrenched camp at Quetta, unless it accepts battle, with the alternative of facing to both its front and right flank. With good telegraphic intercommunication, concerted action may be expected from two forces operating from the north and west. Such an advanced position loses all its virtue if not used as an offensive base.

We cannot check the outflanking movement on Peshin and Sind by counter forward movements from our posts at Peshawar and Banu, &c.; for, attempting to defend a range of mountains on wrong principles, we shall have relinquished to the enemy all the passes leading from them to Kabul and Ghazni, and it may be assumed that they will be held in such strength that it will be impossible to force them. The projecting bastion of Peshin becomes the most vulnerable point of the line of defence we are now considering, unless we command the hills to the north of its right flank. So soon as they

[1] This aid, be it remembered, can only come from Europe; locally it may be anticipated that enemies will spring up on all sides.

are occupied by an enemy, it can be stormed. They can only be commanded by occupation, or by preventing an enemy capable of offence from occupying them. The possibility of these hills falling to Russia could never have been contemplated by General Jacob, the first proposer of the occupation of Peshin.

We are now in a position to determine the value of the defence we are at present, by the Amir's actions, committed to in India, which consists of a passive defence behind the Indus frontier range, with the left pushed forward into Peshin, together with the power of occupying the Kandahar Province at will. This plan of defence seems to be no better than that just considered, and equally, if not more, to be deprecated. Between Peshawar and Dera Ismail Khan, the same objection applies to the defence (by works blocking the main outlets only) of a frontier passable at many points and fronted by no impassable hills, but which instead offer points within them where troops can be cantoned. The outflanking of the positions in Peshin and Kandahar is more pronounced than if Peshin alone were held. With the enemy at Kabul, Ghazni, and Farah, the passes between Peshawar and Dera Ghazi Khan in his hands, the entrenched camps at Peshawar, Banu, and Dera Ismail Khan must be held in force and their garrisons inactive; Kandahar must be equally held in force, and troops sent to watch the roads to Ghazni and to the Helmand. Whilst troops are so locked up and drawn to the front and flank, what is to prevent an enemy, superior in numbers, from massing behind the Suleiman range and cutting the communications of the advanced force to the eastward of Quetta? Again, it is supposed that the occupation of this outflanking position by the enemy is no hasty one, but that it would follow as a matter of course on his occupation of the Kabul Province, and that there will be a fortified depôt there with good communications to the rear (Ghazni); also that the passes will be held to the Indian border. Here, again, the enemy's forces, although operating on widely separate lines, can act together towards the carrying out of one plan with the same ease as if on the same battlefield, so unassailable are their lines of intercommunication through the Hazara hills, Afghan Turkistan, &c., &c., and secure would be the lines of telegraph uniting them.

The greatest evils of the lines of defence hitherto considered have yet to be mentioned, and lie in giving to Russia a free road to the Persian Gulf and access to Baluchistan. These evils are not further considered here, for they open up the wide subject of the value of Persia as an Indian buffer, which again must be conjointly studied with the part that Turkey in Asia is capable of playing in Western Asia; both alternatives secondary to the direct defence of India through Afghanistan. The only other case that here remains for us to consider is the defence by a line of works behind the Indus, combined with the occupation of, or, at least, the power of occupation of, the provinces of Kabul and Kandahar by the perfecting of communications by road and railway with India, and along their front.

The occupation of Kabul, Ghazni, and Kandahar as main positions

with outposts in the occupation of the Hindu Kush and its ramifications, combined with the power of taking the initiative beyond the Helmand towards Sistan and Herat, and eventually, if necessary, in Afghan Turkistan, is that which the train of reasoning adopted at the commencement of this paper pointed to, as sufficient for the defence of India; the main defects of the cases afore-considered disappear—no outflanking is possible that cannot be met by a small force. The entrenched camps of the Indus plains are no longer threatened, and need not be held in force, and whatever their eventual value may be, it will remain to them and come into force should the advanced troops be compelled to retire into them; the passes are held throughout. This method of defence is approximately that considered sufficient by Sir E. Hamley, who, viewing the position "as an abstract military problem for the defence of India under present circumstances (1884), and supposing sufficient additional troops to be forthcoming," advocated "a strong British government at Kandahar, wielding an army whose advanced posts should be at Kabul and Herat, based on Karachi, with railway communication at least thence to Kandahar."[1] It differs from it in considering that Kabul and Ghazni, with their advanced posts about Khinjan, Bamian, Lal, &c., must be held from Peshawar and the direct rear, and not from Kandahar, and that the more extended railway communication already noted is desirable within the northern and southern zones.

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|---|---|
| Peshawar to Kabul ..... | 175 ms. |
| Kandahar to „ ..... | 320 „ |
| Kabul to Ghazni ..... | 150 „ |
| Quetta to Farah ..... | 370 „ |
| Quetta to Sistan ..... | 500 „ |

In this system of defence, Khinjan, Bamian, and favourable points in the Besud-Hazara, Deh-i-Zangi Hazara, and Deh-i-Kundi Hazara districts are of great importance, for they are fertile districts, and the three latter are the granaries of Hazara, with good resources in transport, sheep, fodder, and firewood. Communications with Kabul are, or can be, readily made passable to artillery; the country is hilly but with wide and fertile valleys, well populated, and offering few difficulties to the movements of troops. The arguments raised against the occupation of the Kabul Province are:—

(i.) The difficulties of supply and transport;
(ii.) The division of command, and the distance between the Peshawar and Karachi bases;
(iii.) The difficulty of traversing the long passes, and the processional order in which they must be threaded;
(iv.) The danger of leaving unruly tribes in rear;
(v.) That the front Kabul—Kandahar is defective in that intercommunication is along its front, and not in its rear, and that consequently, when attacked, its defenders must retire by separate passes without intercommunication.

[1] See Lecture published in vol. xxviii of the Journal of the Institution.—Ed.

(i.) The difficulties of supply and transport are reduced to a minimum by railways. (ii.) The right and centre are the defensive zones of the theatre, and co-operation with the force actively operating in the southern zone could be sufficiently ensured by communication carried on through the Hazara country, and along the Indian lines of telegraph. (iii.) The difficulty of threading a long pass is reduced to a minimum so long as it is held in the military sense. It is when it is defended by an enemy that the processional order of traversing it becomes dangerous; when in occupation the troops can be concentrated in the open valleys, and the route organized and provisioned to its extreme point, and it is only when the passes are defended as above that concentration is prevented, a fact that points to the necessity of securing them by the occupation of Kabul and Ghazni; an argument in favour of the occupation of the province, and not against it. (iv.) It would be much more dangerous to leave the tribes in front open to the blandishments of the enemy, than in rear. In what does their unruliness consist? In refusing to join us unless we promise to protect and take them under our rule for ever, and not to hand them over, when we have done with them, to the mercies of other masters to whom we may bequeath our rule? It is our duty to tutor them into submission and loyalty, and to allow them no longer to continue to occupy an impossible place amongst other neighbouring peoples who have risen above their state of barbarism. Should we neglect to do this, the anguish will be ours to know that what we failed to do, and what we neglected, will have fallen to the lot of another, not more powerful nation, but one with greater energy and determination to carry out her civilizing mission, and for which she will be rewarded by a very substantial addition to her Eastern military power. (v.) The front Kabul—Kandahar cannot be attacked in any force except about Kabul and Kandahar. If driven from the positions of which Kabul is the kernel, and the Khyber Pass be defended by field-works thrown up to cover its entrance and at the most difficult points along its length, and with its outlet covered by works at Peshawar, it should be impossible to force; and if driven from the Kandahar positions, the retirement would be orderly and back upon reserves. In either case, it is necessary that the country should have been previously well occupied in the military sense, cultivation improved, trade increased, communications opened, and our authority recognized. We should *now* be actively employed in this development of commerce and civilization, and all time not utilized to this end is time lost. The same is the case with the Ghazni force; its retirement should be orderly, and easily covered by the rear-guard; its flanks could not be assailed; and although one force cannot readily help the other, their safety is not compromised, and junction is unnecessary on the west side of the Indus.

All our considerations hitherto have pointed to the conclusion that whatever loss of territory endangers the defence of the central and southern zones, also eventually enables the flank of the line of operations in the southern zone to be turned, and compels a retirement along the whole line; they have indicated that Afghanistan is an

outwork of India, and must be defended by her best troops. We do not propose here to enter into the detail neccssary to determine the numbers required to defend the N.W. frontier on the various hypothetical cases just considered. They depend greatly on the resources of the country, and the force that the enemy can bring into each zone; after permanent occupation it is to be borne in mind that to give a man 1½ lbs. of bread daily for one year requires but one additional acre of average land to be sown with wheat. Sheep abound in various parts of the country. Much, too, depends upon the feeling of the Afghans towards us. The result of the study is that for the northern zone (active and defensive), with the Afghans friendly, 30,000 troops are required, *i.e.*, 10,000 Europeans, 10,000 Indians, 10,000 Afghans; with the Afghans (in this term the majority of the inhabitants of Afghan Turkistan, Herat, &c., are not included) unfriendly, 60,000 British troops, half Europeans, half Indian. The central zone, having Ghazni as a chief *point d'appui*, can be held, with the Afghans either for or against us, by 5,000 men, for it comes under the influence of the forces holding both the northern and southern zones. In the northern and central zones the narrowness and difficulty of the roads limit the extent of the fighting front, but to no very great extent the power of concentrating troops, for bodies of 8,000 to 10,000 men with mule carriage could move along them 10 miles daily, the tail of the column each day closing up and camping with its head. To prevent concentration, the hill passes must be actively defended, and their debouches occupied. The barriers of mountains, and the difficulties of roads in these zones, take the place of living defenders; give them up, and the only recourse is to substitute for them a barrier of men. Britain having now to take her place as a military nation whose borders approximate closely to those of one of the greatest military Powers, it becomes of paramount importance to enlist on her side all such physical difficulties of ground, so that security may be obtained at the least cost of men, money, and defensive works. To operate in the southern or offensive zone, the largest numbers are required; with the Afghans friendly they may be estimated at present at 60,000, of whom 10,000 might be Afghans, and with them against us, at 70,000. These numbers must, of course, be determined by the number that Russia can put into the field towards Herat, and feed when there, under existing circumstances (estimated at the low figure of 45,000 fighting men), exclusive of camp followers. Whatever additional number an enemy can put into the field here, Britain will have to meet, probably by her own flesh and blood. Assuming these numbers then as approximately correct with the Afghans with us, we require for the defence of India, the railways enumerated and 75,000 fighting men, and with them unfriendly, 135,000; very moderate numbers considering the efficiency of the defence given, and due to the very defensible nature of the Hindu Kush range. Moderate as they are, they err on the side of safety, and show that at the most we require to defend India, if her administrative limits are stretched to their natural and geographical limits, an active army of 130,000 men, under the worst

of circumstances, with an Indian garrison of say 100,000, or 230,000 men in all; reserve corps to meet whatever numbers can be put in the field against us in the Herat province, above 45,000 men, and the drain of such an army (considerable), would be required. A large portion of the Indian garrison would naturally be stationed in the Indus camps and in Peshin, and the flower of the armies of the native Princes would be actively employed out of India.

The possibility or the likelihood of the pure Afghan defence being efficient is so problematical, that the idea becomes altogether visionary when soberly considered; consequently the restriction of our operations to the southern zone, in case of operations becoming necessary, is so tantamount to an impossibility, that it is almost unworthy of serious consideration, and in the aforegoing calculations the pure Afghan defence has been omitted, and the Afghans are considered to be co-operating with us, under British command, to a limited degree, or to be in part hostile, and to be coerced by British and Indian troops and levies of Hazaras, Kizilbash, and Baluchis.

It now remains to estimate roughly the number of men required to hold a defensive line behind the Indus and the advanced bastion of Peshin; this is best done by considering the force that can be brought against it. We may assume that the Kabul Province can now support an army of 60,000 men; the Kandahar Province, 30,000; the Herat Province, 50,000; Afghan Turkistan, 50,000; or that Afghanistan can feed within its borders an armed force of 190,000 men. This estimate is a most moderate one, for Afghanistan has an area of about 500,000 square miles, and allowing ten souls or two families to the square mile, we get a total population of 5,000,000 of souls, or 1,000,000 families; it is quite possible that the population may be more nearly double what is here assumed. In Eastern countries, such as Persia and Afghanistan, it is no hardship for each group of five families to furnish one fighting man to serve in the so-called army, and it may be therefore assumed that any strong ruler possessed of the means of paying them could raise and equip in Afghanistan a very efficient force of 200,000 men of a better fighting class than the ordinary dweller in the plains of India. In the enlistment of such levies there is great advantage; it renders the subjugation and final pacification of the country more easy, without loss of manliness on the part of its inhabitants, and in them all troublesome and adventurous spirits try to deserve and obtain service.

Again, when we consider the numbers that would be reclaimed from a normal to an agricultural life, under a settled rule, the produce of the country, it may be confidently assumed, could be easily improved to support an addition of 5 per cent. to its present population within five years, and 10 per cent. within ten years. This is only an addition in the first case of one man per four families, and in the latter one man per two families, a most moderate estimate, which would, no doubt, be more than doubled in reality. Thus, within five years, the country could, at the most moderate computation, bear the burden of supporting 250,000 foreign troops, and,

within ten years, 500,000. The latter figures require but 500,000 additional acres, or 100 square miles, $\frac{1}{6000}$th of its area, of average land to be sown with wheat. Afghan Turkistan alone could more than furnish this additional acreage. In our Indian frontier plains and newly acquired districts, cultivation has increased in a much greater rate than is above allowed for, in some districts doubling itself in thirty years. Increase of wealth and strength, of cultivation, and of numbers consequent on a stoppage of wars and the reclamation from a nomad to an agricultural life is in progress over the whole of Central Asia.

These figures then give that Afghanistan could now support an army of 190,000 men, and that within ten years under a fostering care 500,000 additional might be stationed in it without looking beyond its borders for food; and that the country could be drawn upon for an army of 200,000 men (of whom not one half need necessarily be Afghans), without causing any stoppage to trade or agriculture, or giving anything but intense satisfaction to the country, if the men drawn for military service are properly paid. Allowing two-thirds of the additional force fed to be soldiers, the army that might be raised and concentrated in Afghanistan within ten years of occupation, and fed there, for operations may be reckoned to be:—

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|---|---|
| Foreign troops, $\frac{2}{3}$rds of 690,000 ..... | 460,000 |
| Afghan „ ..... | 200,000 |
| | 660,000 |

Good communications by rail and road would enable these numbers to be maintained.

It is left to others to say whether, should this force be inimical to India, she could be defended by any less number, considering that they would overlook her borders, and occupy the passes up to the very works blocking them on the further side. The success of the defence must ever depend on the proportion that exists between the means and forces at its disposal, and the ability with which they are employed, to the means, forces, and ability of the attack.

The troubles that must arise in India and in its border kingdoms from a conquest of the greater part of Afghanistan by Russia are not considered, although the dangers arising from them will be great and costly to counteract; nor is the political question discussed, for when military considerations are of paramount importance, diplomacy must play a helping part, and work only to the attainment of the military aim.

The disadvantages of the line of the Hindu Kush as the defence of India are said to be: its extent and its distance from India; the extent of frontier to be defended between Faizabad and Herat is about 600 miles; the length of the frontier from Peshawar to the Khojak is about the same, but with this most important difference, that, in the former case, the real fighting front extends from the neighbourhood of Kabul to that of Kandahar, a distance of 350 miles, the greater part of which is covered by hills, the main passes through

which it is only necessary to hold; and, in the latter, the whole 600 miles of frontier line must be held because of its comparative greater vulnerability.

The essential differences between the defence of the one and the other are that in the one case it is conducted from the proper side of the passes, and that the configuration of the deep intricate hills allow of the knots of difficult roads penetrating them, and which are closed by snow for three months in the year, being defended economically by field armies in secure positions well placed to block their outlets; and that in the other it is conducted from the wrong side of the passes, and that its fronting barrier of hills is passable at many points, which can be blocked only by an uneconomical expenditure of force, and behind the narrow rugged screen of which elevated plateaux and valleys exist favourable to the movements of troops and their concentration, after due preparation of roads and depôts.

With regard to distance, that of Kabul from India, about which place only would troops be concentrated, is 175 miles. Bamian is distant from it 110 miles, and Ghazni 90 miles. Holding selected positions in the vicinity of these three points in force, with posts pushed out along the roads already referred to, *i.e.*, to Khinjan, Charikar, and into the Besud, Deh-i-Zangi, and Deh-i-Kundi, Hazara country, the defence of the northern zone, that is of the whole line of the Hindu Kush and its western spurs, is assured.

To show clearly the necessity of actively pushing operations along the open, funnel-shaped country leading from India into the Herat Province, let us investigate its value to a rival military Power. The value of the Kabul and Kandahar districts in immediately blocking the exits of the passes and roads leading to Kabul and south to Kelat, and in closing the mouths of the main passes penetrating the hills between Peshawar and Quetta, and as bases for the initiative, is seen at a glance, but the great importance of the Herat Province is not so directly apparent. It has been called the key of India, because of its advantages to the invader; these are:—(i.) its fertility and great latent resources; (ii.) the supplies that could be drawn from it by an army in occupation without overtaxing its resources when these shall be fairly developed, and which may be calculated to be capable of supporting 90,000 men (a moderate estimate), and from the neighbouring districts of Khurasan and Sistan supplies could be drawn for 20,000 to 30,000 more. All the materials (lead, iron, sulphur, saltpetre, &c.) necessary for the organization of such an army and the formation of its depôts (supplies of grain, fodder, sheep, &c.; hardy and docile recruits, &c.) are to be found in the neighbourhood of Herat.

All the roads leading through the hilly Hazara country on Kabul, Ghazni, and Kandahar, as well as the southern roads on Kandahar and the northern road *viâ* Balkh on Kabul, threatening Afghanistan's main towns, are commanded by it. Although the roads through the Hazara hills are easy, as at present, to infantry only, and difficult to cavalry, they would not remain long impassable to guns were Herat in the hands of a military Power; indeed artillery has traversed the

Daulatyar—Bamian road, and by it the Amir's post, escorted by cavalry, can reach Kabul from Herat in ten days.

The province of Herat, therefore, commands Afghanistan, and Afghanistan commanding all the passes leading into India, it is said that Herat (*Province*) is the key to India. Notwithstanding the ridicule with which this statement is often now met, the military reasons given above, and the political ones not touched upon (dangers of intrigue, &c.), prove it to be no vain idea, but rather a very unpleasant truth. Looking further afield, and considering the necessity of rendering Persia strong, its administration and occupation are necessary to watch over her integrity, and prevent Russia drawing supplies from Khurasan. It covers, moreover, a possible line of railway connecting India with Mid-Persia.

The above considerations will suffice to show its imperial strategic importance. Sir H. Rawlinson has said that he would give up all Afghanistan rather than that Herat should be in the hands of Russia. Herat and Kandahar, he stated, were the Malakoff and Mamelon of India, the former of paramount importance to the latter.

To Russia and to Persia, the value of Herat is clear, and to ignore it ourselves under the false idea that to acknowledge it would be to raise its importance in the eyes of others is impolitic and inadmissible, inasmuch as its value, both as a military position and political lever, is unfortunately only too well known already.

The objections that may be raised to the Herat Province as a theatre of war are—its distance and the expense of operating so far; as to this latter, if it be the best theatre to operate in for the defence of India it is also the cheapest, and, as to the former objection, it is proposed to operate by railways connecting Sistan with Quetta and, if necessary, with the Persian Gulf, running out branch lines to the northward to suit commercial and military requirements.

Railways annihilate both time and distance, and, if not open to raids, are the best of all lines of communications, multiplying both men and means. The railways best calculated to further operations in the Herat Province answer the requirements of good military lines of communication, and serve at the same time commercial aims. Such a system would tap the trade of Central Asia, draw it to Kabul and Herat, and develop thousands of square miles of fertile lands.

Again reverting to the subject of expense, which is now-a-days the crucial test to which all projects, whether military or commercial, are subjected by us, a frontier fulfilling for the most part the military requirements of defence must be *de facto* less expensive to secure than one which fulfils them imperfectly, and which leaves a sufficient part to the enemy to enable him to vitiate the whole.

It is thus with the defence of Afghanistan:—No one of its provinces can be given up without endangering the defence of the whole. No one ever dreamed of allowing the Kandahar Province to pass into Russia's hands, and yet it is of no greater importance than that of Herat or Kabul, or even of equal importance. Give up Afghan Turkistan, and you give up the glaçis of the fortress—this is the least dangerous to its security. Give up the Herat Province, and the

ravelin is gone; not an empty ravelin, but one well stocked with supplies and the sinews of war. Nothing, then, but a sally of the garrison can save the fortress. Give up Kabul, and the covered way of the fortress in front of its most vulnerable bastion is lost, and nothing can prevent its being crowned and the batteries opened, except, again, a sally of the garrison, and the driving of the besieger to the very extreme slope of the glaçis. The difficulties and exertions attending such desperate sallies will be avoided, if, in the first instance, the glaçis and ravelin be strongly occupied, and the first sallies be made from them. It should be here borne in mind that for the defence of a fortress a perfect system of communications is necessary, none of which at present exist in Afghanistan.

Some may hope to raise the siege by operations in Europe or Siberia, others by European or Asiatic alliances. In considering such, Indian public opinion must be reckoned with, and we prefer a direct military defence combined with naval operations in European and Asiatic seas.

There is ever a great fascination in the "idea" of fighting nearer home, but unfortunately the foregoing study proves it to be a very baseless vision, extremely dangerous to entertain, and to act upon which would be to court disaster; indeed, let us hope that its suicidal fascination may vanish when its dangerous tendency is understood.

We have yet to say a few words on the Indus as a frontier line. We have here to consider the result of substituting Russia for Afghanistan as a neighbour, a mighty European and Eastern Power for a weak Oriental State. Streams are generally less valuable as a defence than mountains, as they fall by one defeat and allow of no after defence, as in the case of mountains; all direct defence of rivers resolves itself into a defence by a cordon of posts, the most dangerous of all defence and the least to be trusted to. It can never stand before "superior numbers," which must eventually make themselves felt, and it has been demonstrated that these numbers may be swelled to 700,000 men after ten years' peaceful occupation of Afghanistan by an enemy of organizing powers.

A campaign such as that described in Afghanistan is a move on the Imperial board that circumstances may force Great Britain to take. To hold back is to give all the advantages of the initiative to the rival, and to become weighted with the necessity of ejecting him from territory which in his possession is most dangerous to, indeed finally fatal to, the security of the Empire. It is not meant that it is the only move, but it is one of three, for either Turkey, Persia, or Afghanistan is a shoal against which the northern wave of advance may be made to break its force and waste its power. Although Turkey in Asia and Persia are held to be Imperial bulwarks, they are not so by any means exclusively by reason of India forming part of the Empire, for if railroads be run through them by any other Power than England commercial loss will result to her to an extent equivalent to a national misfortune. We throw over as absurd dreams all idea of the defence of India through these countries,

because we base our considerations on what now exists, on the old and now impossible state of no communications. Did we look forward to what must be, and encourage the initiation of roads and railways in them, we should at once appreciate their value as imperial defences, and their incalculable worth to the attack. India *cum* its outwork Afghanistan, it has been here shown, is capable of self-defence, and need not rely for absolute safety on either; Afghanistan is the true bulwark of India, and in her entire control, with her communications by railway properly developed and reaching to Kabul, Kandahar, and Sistan, she need fear no aggressor, provided always that she keeps up an European army of sufficient size. Nothing less than this, and a complete understanding with Afghanistan, would seem to suffice to meet the necessities of the case if the defence is not to be conducted from Armenia in alliance with the Turks—an indifferent alternative resting too much on others and too little on ourselves.

Each of these Eastern and decaying Powers of Afghanistan, Persia, and Turkey in Asia must be placed under such relations to the British Empire that good government may ensue and the strength that results from it:—a firm ally and an integrity of empire that cannot be called in question. These relations can be engendered peacefully by the construction of the commercial line of railway, the general alignment of which is shown in part on the accompanying map. It gives the civilizing influence necessary to enforce just government, and supplies the means of developing the latent resources and material strength of the countries through which it passes, and without which they must continue to decay.

This study has pointed to the value, as a defensive range, of the mountains covering India to the north-west, a continuation of the Himalayas, a belt aptly called by the ancients, apparently men wiser than ourselves, and whose wisdom we are but beginning to appreciate, the Hindu Kush, *i.e.*, the defence of India. Afghanistan has always been considered by them to be the "outwork of India." Its occupation by a military rival can be only likened to the crowning of the glaçis in front of the most vulnerable bastion of the fortress, and the unmasking of the breaching batteries necessary to open the way into the enceinte of the main work. From the crowning of the glaçis to the fall of the fortress is never anything but a question of time.

It will be said that we have found it impossible to hold Afghanistan, and that where we have failed Russia is not likely to succeed; in our case it must be remembered the impossibilities were visionary, of our own making, and due to want of policy, of determination, and of faith in our power. Russia, in her case, has proved her power of overwhelming and pacifying Mahamadan peoples as difficult to rule as the Afghans, her determination to do so, and her faith in her power to do it. If our rival be allowed to occupy the glaçis provinces of Herat and Afghan Turkistan, after the few years necessary to inaugurate government and develop communications and supplies, the ravelin provinces of Kabul and Kandahar must fall to her whenever she desires to occupy them, unless previously forestalled. Similarly, after the few years necessary to develop in a like manner these latter provinces, she

will be in a position to invade India with every chance of success by at least half a dozen routes connected by railway and road with Trans-Caspia and Turkistan, and through them with the military power of Russia proper; or, by intrigue with the Afghans, who may turn against us on our expressing our inability to help them in the glacis provinces of Afghan Turkistan and Herat, the invasion might take place in less time. The measures required to enable India to place herself in a position to help the Afghans to defend themselves in these outlying provinces are the construction of communications, already required by commerce between India and Kabul and Sistan, but as yet not desired by the ignorant Afghan or Persian. A settled policy tranquillizes and cuts short opposition; and such a high authority as Sir H. Rawlinson has stated that he was of opinion that had we governed Afghanistan since 1842, it would now be as orderly as the Panjab and Scinde; Lieutenant Broadfort, also, after considerable intercourse with the people during and after the first Afghan war, stated it to be his opinion, slowly and deliberately formed, that a better taxation and a strong government could alter the country in a generation.

It was at that time believed throughout Afghanistan to be written in the Heavens that our sway was to extend from China to Damascus. The power of such a belief to influence a Mahamadan nation is in itself of such great importance, that to allow it to die was an error; to allow it to pass to the credit of another would be one of still greater magnitude. This opinion is also borne out by the present condition of the Peshawar border tribes, who now, although not subject to us, find it more profitable to keep the peace than to raid. Once order and government are established, what is to prevent Afghanistan from becoming self-supporting, and an addition of power to the Empire and an increase of strength to our armies? It is certain that under our rule Afghanistan would become civilized. Conolly writes:—

"The state of society in these countries is such that, however much virtue may be admired in the abstract, it is thought imprudent generally to practise it. A wise parent gives his son a sort of Janus education, telling him of a few virtues, but initiating him into the mysteries of every vice, in order that he may be a match for his demoralized neighbours; and thus nearly every person commences life prepared to be faithful to his friends, and an honest man or rogue to the world, as may be. False oaths and treccherous dealings are held by them to be justifiable when cruel oppression rules the land. Oppressive governors give rise to roguish subjects."

The question of expense would seem to be the chief objection to the Oxus and the Hari Rud as the frontier of India. If, however, it has been shown to be the natural as well as the military frontier, it must eventually prove to be the least expensive to hold, because it can be defended by the least number of men with the greatest chances of success. A project which, when calmly and well considered, promises the greatest amount of security possible with the expenditure of a moderate amount of means ceases to be ambitious, or impracticable, or an abstract project, or to be beyond the means of a

State seeking security, and requires only for its realization a temporary application of extraordinary means to be hereafter paid back with interest.

To place the fighting strength of Afghanistan in Russia's hands would be for us to lose a force of great military capabilities and to array it against ourselves. None but a foreign Power can weld together into a homogeneous whole, and satisfactorily administer for the general good, the discordant elements of which Afghanistan is composed. Should the efforts made to introduce a satisfactory rule be resented, stern measures, followed by a general disarming of the population, the deportation of hostages, and the proclamation of the assumption of rule would suffice to break the backbone of resistance. Partial risings may occur, several may die by the hands of fanatics, yet the great majority will be benefited and content, and be drawn to serve their rulers by self-interest and a strong and just government. It must be remembered that but one-half of the inhabitants of Afghanistan are Afghans; the other half are Hazaras, Aimakhs, Turkmans, Usbaks, Kisilbash, &c., with no love for their Afghan masters, and ready to array themselves against them.

Let us steadily also bear in mind Russia's commercial aims. They are those attributed to Peter the Great, and are directed to force the commerce of Persia, as well as of India, through Russia; with this object Peter determined to form an empire in the neighbourhood of the Caspian. His will, whether spurious or not, is an important study. It runs somewhat thus:—

"We must progress as much as possible in the direction of Constantinople and India. He who can once get possession of these places is the real ruler of the world. With this aim we must provoke constant quarrels, at one time with Turkey, and at another with Persia. We must establish wharves and docks in the Black Sea, and by degrees make ourselves masters of that sea, as well as of the Baltic, which is a doubly important element in the success of our plan. We must hasten the downfall of Persia, rush on into the Persian Gulf; if possible re-establish the ancient commercial intercourse of the Levant through Syria, and force our way to India, which is the storehouse of the world; once there, we can dispense with English gold."—CREAGH.

The acquisition of Afghanistan by Russia would leave her paramount in the East, and enable her to absorb at will, without much reference to the Power holding India, Baluchistan, Persia, and Turkey in Asia, and be the first step towards establishing her as an Eastern naval Power, the magnitude of whose dominion would then render India a possible prey.

The acquisition of Turkey in Asia by Russia, unless we drained our resources by holding South-west Persia and kept up a perpetual blockade of the Persian Gulf (an impossibility), would end in very much a similar result.

Our coming wars will be Imperial wars, so must their cause be Imperial, and the defence of India has an immediate and important bearing on the future well-being of our Eastern Colonies, which we proceed to refer to. Our Imperial wars should be fought with Imperial aid and with Imperial troops. The Empire may be lost

through the loss of India, and not by the loss of the command of the sea alone, as some suppose.

Whether this defence be conducted through Turkey in Asia or Afghanistan—and India must, it is held, be defended through one or the other—it equally affects our Australasian and Chinese Colonies.

The Australian States form an European Power with, as yet, undeveloped resources, set in the East, and from their geographical position it results that their interests are more or less bound up with the Eastern Powers of China, India, Persia, &c.

The defence of Afghanistan, of Asia Minor, and Persia, and therefore of India, is in consequence clothed with an Imperial importance of the greatest interest to the Australasian States, and their acquisition by Russia would at once compel them to prepare to resist a growing power formerly only of interest to them by reason of her far distant possessions and constant southern expansion in the North Pacific Ocean. Too little thought is given by the Australasian Governments to the Eastern menace; it would be well for them to put forth their utmost strength to aid in setting it at rest, once and for all, and this can be done, not by half measures sufficient only to postpone the evil during this generation, but by measures calculated to destroy it effectually.

Both the offensive and defensive powers of these States seem to be over-estimated. The difficulties of the defence of an island-continent populated to any extent at a few points along its coast only are very great, and it is as likely to collapse under a severe strain as the thin crust of an empty shell, when great pressure is brought to bear upon it. Their safety lies in distance and time.

Consider for an instant the position of a strong and inimical Power in the Persian Gulf, the navigation of which is safe at all seasons, and with a temperature not ill-adapted to Europeans. Two rivers, navigable or capable of being rendered partially navigable, the Tigris and Euphrates, give access to the interior of Asiatic Turkey, and the Kaukasian resources of Russia. The Karun is navigable to Shustar, and affords an easy road into Persia; and by these rivers would the corn, barley, wool, &c., of vast agricultural and grazing districts be placed at the disposal of its possessor, and by them, and the railways which would follow their acquisition, would Indian produce be carried to Europe, to the ruin of our own carrying trade.

The mouths of the Karun and Shatt-ul-Arab are suitable to the establishment of arsenals and dockyards. The Persian Gulf abounds in islands also suitable for their construction. Both shores of the Gulf are far from wanting in supplies of transport and grain drawn from districts far inland by mule, camel, and donkey carriage, and within 100 miles inland are hilly regions suited to the cantoning of armies. The mouth of this inland lake is but forty miles broad at the Straits of Ormuz; and with the island of Kishm fortified and protected by a fleet of ironclads and torpedo boats, a second Sebastopol, it would be difficult to force, and be a nursery ground for predatory expeditions.

It becomes, therefore, of the greatest importance to our Australian Colonies to secure the impossibility of such a state of things so counter to their interests, ever maturing to accomplishment.

The British Empire consists of a number of practically independent Colonies bound to Great Britain by the sea, and without a settled Imperial policy. Her increasing strength, represented by increase of population, is being annually disseminated over America, Canada, the Cape, and the Australasian Colonies, &c., and passes beyond the reach of the central kingdom. Russia's like increasing strength never passes beyond her reach, and is organized into commercial and manufacturing centres, drawing their raw material (cotton, wool, silk, &c.) from what are practically her home Colonies in Siberia and Central Asia. Her strength is consequently increasing from this cause, and by reason of a larger population and the rapidity of communication given by railways, in a greater ratio than ours. The result of such Russian frontier concentration of increasing producing and manufacturing powers must be a continually increasing military pressure upon our Indian borders and trade competition under conditions weighting Great Britain, unless she takes measures to retain her present commanding position of chief carrier and supplier to the East.

The firm position in Afghanistan that it is necessary we should hold will enable us to counteract the advantages, both commercial and political, that Russia hopes to gain when her system of Asiatic railways shall be completed and in connection with a circular railway from Moscow; a system forming a periphery around the Aral-Caspian depression, than which no more natural railway communication, nor one that would be better in keeping with the far-aiming plans of Russia's policy in Asia, could easily be thought of.

No defence of India is of equal value to the direct defence, the defence of Afghanistan, based as laid down, because it depends for its success on ourselves, and on the application of means within our power, and can be secured against all interference and flank attacks by means within the sphere of our own legitimate action, without the aid of allies other than the Afghans, through whose territory we should now push our rails and our trade to Kabul, Kandahar, Turkistan, and Sistan, and over whom we must eventually assume a direct relationship commensurate with the close bond necessary to our commercial and military needs.

Without these lines of communication and without such close tutelary union, Afghanistan is the arbiter of the fate of India, she being, as shown, the custodian of the covered way and outworks of her "enceinte," so vital to her safety, and which her deepest interests require should be garrisoned, when the necessity arises, and defended by her best and most loyal troops. Her vassalage to us should not be less than that of Bokhara to Russia.

No reliance, as stated, should be placed on Afghan faith, or on opinions of Afghan unity, beyond what can be undone at no great and prohibitive cost, and these communications are necessary to this end and to check Russia at the outset; for they enable us to place ourselves in positions whence we can strike her, if she attempt to occupy Afghan Turkis-

tan and the Herat Province, and which we cannot do without them, and without which power we run the imminent risk of setting the Afghans against us by our want of power to help them. Our best safety seems to lie in the bold course of forcing intercourse, in pushing our rails through Afghanistan, and in taking measures to defend them *pari passu* as they advance; and our greatest danger to lie in timidly holding back, for with an enterprising and powerful nation on the frontiers of Afghanistan, the *status quo* of the past fifty years is impossible, and the latter Power can no longer be allowed to remain a country closed to trade, to free intercourse, and to civilization. It is also instructive that we should call to mind that the result of our past frontier policy in India is that she is to-day the one Empire of the world placed in Coventry by her neighbours, and that along the length and breadth of her frontier line, from the extreme east to the far west, an Englishman dare not cross the border; indeed, that she holds aloof as much as possible and as long as possible from the barbarous tribes within her borders, and that her neighbour and ally the Amir of Afghanistan brooks no interference, and is practically master of the situation.

We have often used the words "an enemy superior in numbers" and "should numbers permit." Their frequent repetition emphasizes how our strategy and plans are cramped for want of men, and how meagre will be the results of the success gained by small numbers, calling to their aid all the advantages of country, if unable to follow up the success.

Lord Wolseley must be right, for he is familiarizing the nation with the idea that soldiers are required for Imperial defence; the enlistment of 5,000 or 6,000 more Regulars or Militia will not do; nor will money grants at the eleventh hour do. Of what use were the French Garde Mobile during the last phases of the Franco-German War? Men of a few months' training, soldiers of straw, excellent as individuals but useless as a trained, disciplined body, they were comparatively valueless. To secure both the loyalty and co-operation of our Eastern Allies, whether Afghans, Turks, or Persians, we must make them feel our power both to help them and to compel them to help us in the case of the former. We must rely more on our own flesh and blood than heretofore, now that we have to defend India through one or other of her bulwarks. Let those who do not think so study the causes of the mutinies of our Sepoy troops.

Believe one who has beaten the bounds of the Empire from extreme east to extreme west, Great Britain is no neighbourless insular Power, but an Empire whose frontiers touch on more kingdoms, and consequently one who has more neighbours, than any other Power on earth. Our future wars can no longer be wars of insular but of Imperial Britain.

We are in accord with "Indian Officer," in the main conclusion that he draws in a past number of the "Fortnightly Review," for he shows that India is best defended from India as a base, and by our own blood, not trusting too much to European aid in a struggle in the result of which, if unfavourable to Britain, even

such astute Powers as Germany and Austria have as yet to all appearances failed to see the great and immediate bearings on European politics. Europe seemingly does not realize the fact that Russia in command of Turkey in Asia, which must follow in the wake of our defeat in the East, is in a position by sheer force of numbers to ride roughshod over Europe, and to press onwards as an irrepressible devouring force eating up all produce as she goes, as did the Huns and Goths and Mongols of early history.

Again, we are morally bound to defend Afghanistan, and, in so doing, ourselves, for no right-minded man can conscientiously argue that Great Britain has not guaranteed to the Amir the entirety of his kingdom. The operations of the Afghan Boundary Commission have led the Afghans to place a certain confidence in us, and have raised in them hopes which Britain must be held in honour bound not to disappoint, and there can be no safety in any frontier settlement or any virtue in any mere line of boundary pillars unless Britain place herself in a position to prevent that frontier being violated. Moreover to disappoint the Afghans would draw upon us retributive justice, for this would array them against us as the weaker Power, and the frontier Heratis, Jamshedis, Firuzkuhis, &c., inimical to Afghan rule, so soon as they understand that Britain cannot or is disinclined to help them, will have strong inducements to throw themselves into the arms of Russia.

To sum up the conclusions arrived at by our line of argument:—

1. Afghanistan (including in this term, for sake of convenience only, the independent border tribes) is a perfect defence to India, that is, as mistress of herself, in alliance with us and under our political influence alone.

2. With Russia in possession of Afghan Turkistan and the Herat Province, or if they be permeated by Russian influence, Afghanistan is no longer a defence but a danger to India. The Hazaras would prefer a Russian rule to an Afghan domination, and so would all other tribes alien to the Afghan race. All the hill passes leading into the Kandahar and Kabul districts would then pass into Russia's hands, and with them the possibility of successfully defending these provinces, a possibility at all hazards to be prevented.

3. But inasmuch as the existence of Afghanistan as a nation is impossible between two civilized Powers, and the British and Russian boundaries must touch eventually, in case of a compulsory division of it with Russia, what is the very utmost that can be relinquished to her, provided we are not bold enough to strike for the whole or at least a retention of the *status quo?*

The answer to this question is shown to be that:—The Hindu Kush must be secured to India, with its western spurs and its northern and western skirts in the fullest sense: The Herat Province intact, if possible, its districts of Sabzawar and Farah at least. The possession of these southern limits secures Sistan, prevents any further southern expansion, and they form a *point d'appui* for the offensive towards the north, and a watch tower whence to guard the integrity of Persia. They take in flank any movement from Herat through

the Hazara hills, although not completely preventing such a movement.

4. With any other portion or portions of Afghanistan in Russia's hands the defence of India is still more greatly endangered.

5. With the Hindu Kush and its western branches and northern skirts as a frontier, the fighting front is contracted from 600 to 350 miles in length, and the immediate security of the Indian Empire is insured by a garrison (inclusive of India) of 230,000 men. The reserves to this force to be stationed in Great Britain must depend on the forces that Russia can bring to operate on the line Herat—Kandahar.

With the Indus as a frontier or the skirts of the Suleiman range, India must keep up a garrison capable of counteracting a Power that can put into Afghanistan and feed there an army of about 700,000 men should she desire to do so.

6. Finally that, with the acquisition of Afghanistan, Russia will have cracked the Eastern nut, and it will be in her power to appropriate its contents whenever it may suit her to do so.

## PROCEEDINGS OF THE SPECIAL GENERAL MEETING,

### Held Tuesday, June 10, 1890.

### ADMIRAL BOYS IN THE CHAIR.

The SECRETARY read the Notice convening the meeting.

The CHAIRMAN: Gentlemen, I have to regret the absence of our President, H.R.H. the Duke of Cambridge, to-day, who would have taken the Chair had he not been prevented, and it devolves upon me, I presume, as Chairman of the Council, for the year, to take his place. You have the reason for calling the meeting before you, and I would like to point out that this meeting is a special meeting, called for a special purpose. It is called at the instigation of some members of the Council, with a view of improving the position of the Institution generally, and ultimately, by such improvement, inducing Officers to join. It is very desirable that we should obtain additional members. It is, perhaps, questionable whether it is not somewhat premature to have a meeting now rather than wait until we have some definite decision from the Government as to a new building, but considering that the memorial to the Government on the subject was sent in a year ago, and that we have not yet received an answer to it, probably it may be wise to get the views of members on certain points, instead of waiting until we get a reply. The meeting, as you see, is "to consider the present and discuss the future of the Institution." You will observe the past is not referred to, and I do not think a discussion of anything that has taken place in this Institution would be in order at this meeting; but, of course, if any member has to allude to the past in order to illustrate what he has to say with regard to the future, no objection can be taken. I think there is nothing more to say at present, except to ask the Secretary to read the Memorandum, copies of which are in the hands of the members.

The SECRETARY then read the following document:—

*Memorandum for the information of Members of the Institution attending the Special General Meeting convened for the 10th June.*

(*a.*) The object of the Institution.

The promotion of Naval and Military Art, Science, and Literature.

The principal means by which this object is sought to be obtained are:—A Library, containing Historical, Scientific, and Professional Works; A Topographical Room, with Maps, Charts, and Plans; A Museum, for objects illustrative of the progress of Naval and Military Art among all nations, for trophies and relics, for Mementoes of distinguished Officers, or of remarkable Naval and Military Events, and for the Exhibition of Inventions; A Theatre, where Papers on Professional Subjects are read and discussed; and finally, a Journal published periodically, by means of which papers and discussions, and information regarding Foreign Armies and Navies, in the form of "Occasional Papers" and "Notices of Current Literature," are circulated among the Members of the two Services both at home and abroad.

(*b.*) The present condition of the Institution.

1. Financially.

The funds of the Institution are invested as follows :—

| | Stock. £ | s. | d. |
|---|---|---|---|
| Consols .. .. .. .. .. .. | 16,343 | 16 | 9 |
| India 3½ per cent. .. .. .. .. | 2,028 | 17 | 8 |
| India 3 per cent. .. .. .. .. | 1,816 | 5 | 2 |
| Nottingham Corporation 3 per cent. .. | 309 | 13 | 1 |
| Total | 20,498 | 12 | 8 |

Of this sum, 15,894*l.* 10*s.* 2*d.* is the accumulation of Life Subscriptions, which should not be entrenched upon, and the interest of which is required to meet current expenses, and 4,604*l.* 2*s.* 6*d.* represents the amount of income saved, and is placed to the credit of the "General Fund."

In addition to the above, there remained a balance of 178*l.* 13*s.* 1*d.* in the Bank at the end of last year.

Liabilities. Nil.

2. The Museum and its value.

The Museum is divided into two departments, Naval and Military.

The Naval Department contains models illustrating the Naval Architecture of different countries, from early periods down to the present day, some of which models are on loan. It also contains models of Life-boats and other apparatus for saving life, specimens of Ancient Ordnance, &c., &c., the model of the Battle of Trafalgar, and the Franklin Relics.

The Military Department contains specimens of mediæval armour and weapons; a complete series of fire-arms; of native arms from India, China, Africa, South Sea Islands, &c.; models of heavy ordnance and of different systems of fortification; the arms, clothing, and equipment of the different branches of the British and Indian Armies; also models of the Battle of Waterloo, of Sebastopol and the surrounding country, and of some of the battle-fields of more recent campaigns.

The Museum has been valued at 11,000*l.*

3. The Library; its extent and value.

The Library, including the Lending Library, which has proved a great success, contains over 23,000 vols. of Professional, Historical, and Scientific works. There is a Reading Room, where the principal daily and weekly Service Papers can be consulted, also a Writing Room, in which smoking is allowed.

Tea and coffee can now be obtained by the Members.

The Topographical Room contains the Charts and other publications issued by the Hydrographic Department of the Admiralty, maps, plans, &c., prepared by the Intelligence Branch of the War Office; photographs of ordnance, military material, &c., from the Royal Arsenal, and a large and valuable collection of maps, plans of sieges, &c., &c.

The Library and Topographical Room have been valued at 2,500*l.*

4. Number of Members.

The number of Members on the 31st December, 1889, was 4,226.

(*c.*) Situation regarding the assistance which the Chancellor of the Exchequer has been memorialized to afford to the Institution.

It has been suggested that the Government should construct the new building and grant the free use of it to the Institution, whilst retaining in its own hands the full rights of ownership. (*See* par. 6 of the Memorial.)[1]

(*d.*) The proposals of the Council as regards the future of the Institution.

The Council propose that, in the event of the Treasury complying with their representations, the Institution shall be developed upon a scale which shall adequately fulfil the best interests of the Naval and Military Services of the Empire.

[1] Published in the last Annual Report.

The Council consider that the Institution, with its unrivalled Military and Naval Library, and with its Museum increased and rearranged in a way suited to its importance, should form an educational centre for members of both Services.

The Museum should contain specimens or models of all the new and important inventions and appliances proposed for the use of Her Majesty's Naval or Military Forces. There should also be models of all appliances of war, in use by both Services, for illustration and instructional purposes.

The Council consider that the premises of the Institution should be made as attractive as circumstances admit, and that every accommodation should be provided for Members who desire to read, write, study, or consult models, &c., in the building. If this were done, Officers of both Services would find it essential to the success of their career to join the Institution, and would, moreover, find the use of the rooms of the Institution of great practical advantage to them while in London. A large increase of Members would be the result.

(*e.*) Members of the Institution present at the Special General Meeting are specially invited to give their opinions as regards the future of the Institution.

By Order of the Council,
BOUGHEY BURGESS, *Capt.*,
*Secretary.*

ROYAL UNITED SERVICE INSTITUTION,
*6th June*, 1890.

The CHAIRMAN: If any member has any observations to make, I think now will be the time to bring them forward.

Colonel LONSDALE HALE: As I was the primary cause of this meeting being held, it is perhaps desirable that I should be the first to step into the arena of discussion,—a discussion among ourselves, a discussion between us, the ordinary members of the Institution and the Council who govern the Institution, and a discussion which, I trust, will be of a most friendly character. At the Annual Meeting, last March, I undertook to obtain this meeting. Under our Bye-laws I had only to get the names of twenty-four members to a requisition, and this meeting would have been forced upon the Council whether they liked it or not. The Council have met me a good deal more than half way. The Council have not only determined that it is desirable that this meeting should be held in response to my request for it, but they have gone further, and determined that notice of the meeting should be specially sent to every member within reach, and therefore I feel sure that my late colleagues will understand that I meet them in the same conciliatory spirit. There has been some alarm expressed as to the danger that will arise to the Institution from this meeting, but I cannot see that any harm can possibly arise to the Institution from our holding this friendly meeting. Some of us think that we are not in the condition in which we ought to be, and the Council and the members simply meet to discuss how we may improve our position. One word with regard to myself; I was, until last Tuesday, a member of the Council. Last Tuesday, in this theatre, we discussed our proceedings to-day, and from what took place I came to the conclusion that if I appeared here this afternoon as a member of the Council I was liable to be called to order by some of my colleagues, or called to order by the Chairman, for saying something which perhaps was not the opinion of the majority of the Council. Therefore I determined to relieve myself of the chance of being a cause of offence, and I was further determined to relieve the Chairman of a position of difficulty and delicacy in determining a point of order, by withdrawing from the Council. The first reason I had for asking for this meeting was that I know that in the Army—I do not know anything about the Navy—there is a good deal of dissatisfaction among the members with regard to our position. They think, rightly or wrongly, not that we are making no progress, but that we are not progressing fast enough. Now, I know that the fact that this dissatisfaction exists is

disputed, but there are on the Council three members who agree with me. They are personal friends of my own, and whether they have spoken of it at the Council or not I am not going to say, but at all events, in ordinary conversation, my friend General Philip Smith, who I am sorry to say is prevented from being here by illness, has stated that among the Household Brigade, who have always been the warmest and most constant supporters of the Institution, there is a dissatisfaction, namely, not that we are doing nothing, but that we are not going fast enough, and not doing enough. At Aldershot that dissatisfaction prevails to an extent almost dangerous to our Institution, and my friend behind me, Colonel Matthew Hale, who only lately commanded a battalion, has told me that he has had difficulty in obtaining subscribers among his Officers, because they say they get nothing back for their subscription. I think, therefore, I am right, and not my opponents, in saying that there is a considerable amount of dissatisfaction among the members, mainly on the ground let me repeat, not that we are not doing anything, but that we are not doing as much as we should. We are met here together in order to see whether that dissatisfaction is unreasonable or reasonable. But since the Annual Meeting I have had the opportunity of reading the remarks which Lord George Hamilton made, from the Chair, and there is a passage in those remarks which seems to me a sort of warning to us that we must set our house in order, and must do something at once. Lord George says: "I do not wish to go into the disputed point that Colonel Hale has raised: it is quite true that the knowledge that this Institution is in a dilapidated condition may prevent its development, and may to some extent, though I do not think it ought, but may to some extent account for the fact that the number of members is not increasing. But if Mr. Stanhope and I press the claims of this Institution upon the Chancellor of the Exchequer, he will want us to give him some evidence that, when that impediment which it is said now prevents the development of the Institution is removed, there is good *bonâ fide* evidence that this Institution will largely develop, and will play that part in connection with the two Services which would alone justify that large expenditure which he is asked to incur." Now, I suppose, gentlemen, the document placed in our hands as we entered this building to-day is a response to that challenge. It is the latter part of it which gives the intentions of the Council for the future, but when I read it, it reminds me of a very warm place not mentionable to ears polite, the pavement of which is said to be made of good intentions. The Minister does not want words: he wants to see what we are doing in practice: he wants deeds as evidence of the goodness of our intentions. Well, cannot we do something to show that we are really in earnest in our intentions, and endeavour to put a good case before him which will justify him in urging our demands still more strongly on the Government? I know the answer which ought to be given if the Council are consistent with what they have said in the past. The answer which would be given in the first place would be, "We have no accommodation," and in the next place, "We have no money." On each of those two points I will dwell later on, but I think it is only fair that I should point out to you what the means are to which I have referred, and which I think should at once be put into practice. I have not the slightest doubt that every one of my suggestions will in the course of the next ten, twelve, or fifteen years be carried out, but that is not what we want. We want these things done soon, and not put off indefinitely. It is easy, gentlemen, to make fun of any one suggestion I may put before you, but I want you to remember that "Every mickle makes a muckle," and if we can do a little good in a great many directions, the ultimate good will be large indeed. The first thing we have to do is to get touch of the Services. We have either lost touch with the Services or we have not got touch with the Services, one of the two. The number of our members is just the same as it was some thirty years ago, although, since that time, the number of individuals eligible for membership has enormously increased. How are we to do that? We must get rid of those excellent 300 or 400 people who, however, literally do nothing for the Institution except call themselves Corresponding Members. That is absolutely necessary. They do not put a brass farthing into our pockets; and in their place we must get a number of Officers, and a number of civilians if necessary, to act as it were, as pushing agents for this Institution. We want to push ourselves all over the globe. I know on one

occasion the Corresponding Members question was brought forward in the Council, but it occurred to me to be premature then to touch it. But if we are going to make use of our Corresponding Members, we cannot send them out empty handed. It is no use for them to go round and simply ask members to join our Institution, and merely be able to offer them the "Journal." We must be able to give them something else, something in return for their money besides our "Journal," because I imagine a large number do not read the "Journal" at all, and practically give us their 1*l.* for nothing. The difficulty we have is with members abroad. It is most difficult, if not impossible, for the Institution to be of any very great value to Officers out of England, or at a very great distance from London, but, still, something might be done in that way. We may make ourselves, say, a Home Agency, to meet the very reasonable demands which Officers might make upon us. If you will forgive me I will mention four different demands that within the last two years or so have been made upon me by Officers abroad, because I happen to know, of course, a great many men in the Service who have been under me in the course of their education. One wrote to me saying he wanted a small amount of printing done to bring up their regimental records to the present time, and asked me to see if I could get it done. I took it in hand myself, got all the estimates, and sent them out. The next was the case of an Officer who wanted field glasses. He appealed to me to help him, and I got field glasses for him without any private loss or cost to myself, and so I was really acting as Home Agent for that Officer. The third was the case of a regiment that was very anxious to take up kriegsspiel, and I attended to that matter for them, and sent them out the means whereby that game might be carried out. Then there was a case in which some information was required as to whether promotion was going on a certain way in a regiment. It was absolutely no secret, and I got the information from the Horse Guards, not on personal grounds at all, and sent it out. Now, there are other ways similar to these in which we might help our foreign members. I want this Institution to be to those foreign members a centre where every little demand, never mind how insignificant it is, can always be attended to, and where they can get different things done for them. If it were spread abroad that we were a sort of agency in that way for members abroad, that would be one of the means by which we could increase our members. Now, with respect to Officers at home, it was my fortune in life for three years to be a "crammer." Remember, we are an educational Institution. But why should the Officers necessarily come to me or other crammers when they want instruction, especially if it is not, as is sometimes the case, for going up for examination? I was a sort of educational centre. A man wanted to learn a language, to get some instruction in some particular way: he came to me and asked me to procure a man for him. Languages are being taken up in the Army; and why not in this Institution have a French, a German, or a Russian class started by the Institution itself, and conducted by men who would deem it an honour to be named as your instructors, and who would give the instruction to the Officer without driving him into the hands of the private individual? You might extend that to the way in which the Volunteers have obtained their instruction. I know Volunteer Officers who give their labours gratuitously to their brother Officers; but why should not we have our classes here for Volunteer Officers, if they want them, for their examinations in survey, or anything of the kind? If I want to know about a class of languages in my own corps, I write to the Secretary of the Royal Engineers' Institute, and then if we have enough Officers, with his aid we form a class; why should not we be to the Army what the Engineer Institute is to the Engineers, and the Artillery Institute to the Royal Artillery? I have heard my friend Colonel Matthew Hale speak of having classes formed for drawing. Why not? Why should not we in fact be a sort of military South Kensington for the Army and Navy? Then there is another way. We ought to look upon the Volunteers as a most valuable source from which we may be able to obtain our members, but if we are going to meet the needs of the Volunteers we must suit their times and seasons. Volunteers are very fond indeed, perhaps a little too fond, of kriegsspiel. Why not let the Volunteers come here for kriegsspiel any evening they like, provided it accords with our arrangements? Why should not half a dozen Officers have their kriegsspiel here, instead of their not having it at

all, or in some inconvenient place elsewhere? Then again, the Tactical Societies. My friend General Goodenough mentioned that at the last meeting of the Council. He said, "Why do you not put yourselves into communication with the different Tactical Societies of the country, and offer to help them?" Do not wait to be asked by them, but let us actively go forward, and let us give to the different Tactical Societies that help that they want. One of their wants, for instance, is a library. Some of these Tactical Societies are very small. There was some idea, the other day, that the Aldershot Military Society was a rival to us. What have they lately done? They have asked us whether by subscribing to our Lending Library we will lend them so many books per annum. It is one of the best things we have ever done. We have arranged for a fair subscription, and to send down a certain number of books, provided they are not taken out of the library of the Society. I do not see why we should not extend that practice all over the country. We can do it without loss to ourselves. Let us be a centre of the Tactical Societies, and endeavour to meet those requirements which they cannot fulfil themselves. And now I turn to the third point, a point on which I should like the greatest vigour shown, namely, the resuscitation of our Museum. I would have, in the first place, a museum worthy of the name, that should be a pattern room of modern war, which it is not now. I would have every recent improvement from Chatham, Woolwich, from the Navy, from the Administrative Services, every single thing in foreign and military arms that we can possibly want, exhibited in this building. I would not have a museum a place where country cousins might come open-mouthed and stare at relics, but I would have it a place where any Officer if he wants to learn about some other branch of his profession might come and find that identical thing in the Museum of the Royal United Service Institution. If we were to do all this, if we were to place ourselves in communication with foreign members, if we were to start our classes, if we were to expunge all the portion of our Museum that is useless, and have a museum worthy of the name, if we at once entered into communication with all the Tactical Societies in this country, what a grand position we should be in to go next time to the Chancellor of the Exchequer, and ask him for money to aid us! Now, about the accommodation that we have. Having been for seven and a half years on the Council, I know something about that accommodation, and I daresay the Council will kindly allow every room to be opened before you go, so that you may see if there is enough. If you go to the top story you will find what is called the Council Room. The Council Room is used nine times a year by the Council. It is used about as many times by Committees, and I believe my excellent friend Captain Burgess has his lunch there; but beyond that it is really a room which is hardly ever used. The next two rooms are the Assistant Secretary's quarters. If we want those rooms, why should he have them? Why not give him lodging allowance, and let him live out? The Council, some years ago, resolved that it was desirable that he should live in the Institution; but perhaps you are not aware that, so far as regards the safety of the Institution, the Army and Navy Stores, with all their valuable contents, are left at night without a single caretaker in the whole place. It is carefully watched outside, and in the same way I think we might dispense with the Assistant Secretary's presence if we only look after the buildings in another way. Then going from that—you will forgive these details, I am sure—if you can find the keys you will come to a disused room, a lumber-room choked up with cases, and amongst them are a number of geological specimens. We do not want geological specimens here—there are plenty to be seen in Jermyn Street; and you might almost sweep that room clear, and the whole of what is called the third floor in order to get further accommodation. I will not detain you longer than I can help, but I will ask you to walk yourselves through the other rooms. Look at the Battle of Trafalgar—it is a very nice model indeed; and then look at the contents of the military room, where you will find all the foreign equipment of European arms in the year 1862[1]—very interesting, but not much use in the present day. Go through these model rooms, and do as this

[1] These have been packed away for some time, and the arms, uniforms, &c., of regiments of the British and Indian Services are exhibited.—Ed.

Council did in 1858. In the year 1858 they found their museum was out of date. They had a Special General Meeting, as we are having to-day, and they shook that model room to pieces. They turned out everything that might be interesting but was out of date, and kept what was useful. I leave you to judge for yourselves if it would not be better, I will not say to get rid of permanently, but at any rate to store away the Battle of Trafalgar. ["No, no."]

Admiral COLOMB: Store away the Battle of Trafalgar?

Colonel LONSDALE HALE: If the Admiral thinks that the study of the Battle of Trafalgar would be more useful to the naval profession than the study of the latest naval tactics, I will give in; but I should like to get rid for the present, by storing them temporarily away, of those things which were very instructive in the past, but which at present we have no accommodation for, and the place of which might be occupied with things that would be far more useful and valuable to the Officers who are our members to-day. Now, with regard to the model room, the question of money is no doubt the most important question. There are two ways of asking for a model: one is by writing a letter and getting your request refused, and being told that you must pay for it, and the other is by pulling the strings. I have not the slightest doubt that if we had the room, and then we went to the Secretary of State for War and the First Lord of the Admiralty, and said, "We have accommodation, and we want to establish in London a museum, which will be unique—the only museum which exists in the country where the latest things in military and naval science can be found," I venture to say they would not be able to resist our appeal. Having pointed out the amount of accommodation that might be obtained in the building itself—and, of course, I have included this theatre, where kriegsspiel might be played certainly on some nights in the week—I will now pass on to what is known as the "site" question, because I purpose to move, in conclusion, the following resolution: "That in the opinion of this meeting it is desirable that the Council should adopt, with regard to the working of the Institution and for obtaining better accommodation, a more active policy than prevails"—I say nothing about the past—"and the meeting pledges itself to aid them, by all means in its power, in doing so." With regard to the site question, I must refer very briefly indeed to the past history, but not in any way expressing censure upon what took place then. Our system of getting a site has been the same for the last twenty years. We have written what are called "memorials." The Council used to write memorials—they were addressed to the Chancellor of the Exchequer, or somebody else; they were full of quotations as to the value of the Institution, drawn from the speeches of the Secretaries of State for War, Commanders-in-Chief, and other people who have been sitting in the Chair at the annual meetings. Then they went into the office, wherever it might be, and after, it might be a year, absolutely we got an answer back, stating that at present the Government could give no decision upon the point. That has been going on year after year, year after year. Can we imagine any Minister complying with our request, when all the pressure put upon him is a letter sent once a year? Last year we adopted a different policy. We wrote in July, not only sending a memorial, but we entrusted one of the most able members of the Council to try his powers of diplomacy—my friend General Erskine. I have known the General a long time, and I know that there is no one on the Council who was better fitted for the post. General Erskine has done his very best. He has interviewed people; but when I left the Council last Tuesday he said himself all his efforts had failed. Between then and now there may have been an answer; but that memorial which we sent in last July remains practically without any result. You may send in a memorial from this meeting; it will remain a year without any result. You may go on for ever, but unless pressure is put upon the authorities they will not give us another site. What is the alternative? The alternative is to help the Minister. Help him to go before Parliament and ask for some grant. At present, if the Minister complies with our preposterous demands—for they are preposterous—he would be laughed down in the House. They would say, "You ask for 30,000*l.*, with the site and all expense paid; who is it asks for this?" Then the Minister would say, "I have a memorial from the United Service Institution." They would not allow it. But supposing there went from the Services and from civilians also a large deputation, such as in past history we did

once think of—supposing you had a deputation consisting of Peers and Members of Parliament—supposing you had my friend Sir Edward Hamley backing them up, supposing you had men of that class and civilians going to the Minister, and showing really, by the variety of the classes to which they belonged, and by their different positions, the deep interest which is felt throughout the country in the United Service Institution, then the Minister would have something to go upon if he saw that we really were doing work. I do hope that you will express an opinion that it is desirable that the Council should give up that old memorial policy, and that we should, by means of the most powerful deputation we can get together, go to the Minister and address him. The Press will come to our aid; they will have something to work upon, and by that process we shall show before him really in the flesh, the interest that is taken in this Institution. I feel sure that we should then get nearer towards getting a site than ever we have done before. Lord George Hamilton at that meeting used some very remarkable words against deputations. He said he did not like deputations; he said, "There is nothing a Minister hates more than deputations;" and, therefore, he hopes that we should not send any more deputations to him. He said, "It is such an excellent thing to get hold of one representative of the Institution. You can talk over it with him; whereas if you have a deputation with varying views great difference of opinion is likely to arise." My friend General Erskine is the one gentleman he has had to talk with, and, as I say, we may go on sending our most trusted Officers in that way, but we shall never get what we want. Do not let us believe in Lord George Hamilton's dislike of deputations, except as showing that if we do go as a deputation he will feel our power. There is another body that we might get the assistance of in helping us, and that is my friend the Corps of Engineers. Let me just briefly tell you how we stand with regard to the Corps of Engineers. The Corps of Engineers want to establish a branch of their own Institution in London; they want, in the first instance, their library here. Their preliminary offer included a sum of 3,000*l.*, with the understanding that every member of the Institution shall have access to that library, but no member of the Corps of Engineers should have access to our library unless he is a member of this Institution. If I could go to the Engineers, who hold their meeting here next Saturday, and say, "We are going to set to work in earnest; we are going to turn this Institution into a living, active power, and we are going to do our best; will you pull all your strings and help us heartily in it?" You would then have another body helping to get the site question settled; and if you get the Engineer Institute, with its great good will, to help us, there are endless ways in which the prosperity of this Institution can be immensely served. I have only one or two other words to say. Lord George Hamilton said we must not come empty handed to him, and I hope the Council will adopt the clerical practice with regard to the future of this Institution. It is a perfectly moral practice, considering how many clergymen adopt it. A clergyman gets a bit of ground, and immediately begins to build a church, and he builds it by bits, because he is perfectly sure that if he once commences, the money will be recouped him. He is quite right in doing so. Let us go to the Government, not asking them for a site and 30,000*l.* or 40,000*l.* for a building, but, as Lord George Hamilton says, "Let us help ourselves;" let us go and say, "Give us a site; give us 15,000*l.*;" and then commence building, and let us turn to the Services and to the country, and I venture to say we shall have the rest. That is the way to go on, not sitting quietly for a whole year. Let us get the site first of all, and the whole thing will follow. There is only one other point. We labour under the influence of what is called a Charter. It is an awful thing, a Charter, when you want to make progress. We have the assistance of a gentleman who calls himself, and we accept him gladly, as our legal member, and if ever he finds us stumbling over the Charter—whenever Colonel Baylis finds we are going a little astray—he pulls us up. But now my experience of his profession, and the aid we get from it, is this: If I find somebody going to do me any harm I call in a member of the legal profession, and ask him to put as many difficulties as possible in the way of my opponent; but if I want to get round my opponent I put the case before my legal adviser, and say, "Now, how many coaches and six can you drive through how many holes in my opponent's case?" What I hope Colonel Baylis will do will be to say how, without rendering ourselves liable to

the penalties of the law, we can drive our coach and six through our own Charter if necessary. I shall wait with interest any answer which members of the Council will have to make to what I have said. I got into hot water at the Annual Meeting, because what I said seemed to show a disunited Council. The Council is united in one way, but disunited in another. The Council is united in the desire to push forward the Institution, but it is disunited in the way in which it should do it, and it must be so. Look at the constitution of our Council. Our Council is composed of members elected for three years. It contains, as *ex officio* members, Vice-Presidents who remain upon it for life; and among those Vice-Presidents are three whom I have never seen at a meeting during the seven and a-half years I have been a member, and who are probably almost absolutely from age at the end of their life. Then you come to members with various degrees of rank and superiority, and eventually you come down to my friend Colonel Dalton, who is in the centre of intellectual activity in the Intelligence Department, and Lieutenant-Colonel Hutton, the energetic founder and manager of the recently formed Aldershot Military Society. Is it likely that the Council, composed as it is, should take the same view of the best interests of the Institution? No doubt I shall receive criticisms from the Council on my remarks, but I hope that the younger members not only will be allowed to speak, but to do so without being called to order, and that they will tell us whether they think the suggestions which I have made are merely Utopian and impracticable, or whether they think them practicable, and such as, if carried out, would be satisfactory to our members, and would tend to increase the prosperity of the Institution. Gentlemen, I have to thank you for the attention with which you have listened to me, and I will conclude by proposing the resolution that I have just read.

Colonel COLVILLE: In default of anyone else, I beg to second the resolution. I have been a member of the Institution from twenty-five to thirty years, and during that time I have attended a great number of lectures given here. I merely mention that fact in order that the meeting may know that in whatever I say I am actuated by the best interests of this Institution, as some of my remarks may not perhaps be acceptable to all. I think we are very much indebted to Colonel Hale for bringing this matter forward. I have had no communication whatever with him, but he has expressed with that force and ability which he invariably does the thoughts which have filled my mind for many years, and which I have frequently thought of bringing forward myself. I have had many opportunities of speaking to different men, and I say I constantly hear remarks of this character made by members of this Institution and others "that this Institute is behind the age." They describe it as "a musty, dusty, fossilized institution." I am not quite prepared to go as far as that, but these remarks are made constantly in different parts of London and other places by men who have no communication whatever with each other, so that there must be something in it. Now, Sir, I am not acquainted, as Colonel Hale is, with the history of this Institution, or with the Charter, but we have been waiting for a very long time for assistance from the Treasury; and, as has been said, Providence helps those who help themselves, I am inclined to think the time has come when we should take the bull by the horns and help ourselves—throw over the Treasury and burn the Charter. We want members. Now the suggestion I would make is this. Every man that joins the Army wants a club, and puts his name down, but he frequently has to wait some five or six years, and probably more before he can get into one of the best Service clubs. During that time, whilst he is waiting, he is anxious for some place to which he can go, probably to write his letters, smoke, get certain light refreshments, and so on. I believe that if this Institution were boldly to take a large house in Piccadilly, or St. James's Street, and utilize a portion of it as a museum, and another portion for the other purposes that have been pointed out by Colonel Hale, and combine with it at the same time a kind of club, every young man joining the Army would belong to it, and when once he has joined it he would never leave it. The thing would be self-supporting if it were properly managed. The subscription of members at home might be raised, and the subscription for members abroad be reduced by one half. At all events if it were an active political centre of military thought, if it provided museums and classes, and all the rest of it, which have been referred to,

and if it also provided for the comfort of the inner man, looking at the prestige that the Institution already has, it would be an undoubted success. We should have no need of touting for members; it would be self-supporting, and might be entirely without the assistance of the Treasury. I have great pleasure in seconding the resolution.

Colonel MATTHEW HALE: As my friend Colonel Lonsdale Hale has alluded to me by name, I should like to say one or two words of personal explanation, but I shall not detain you many minutes. He stated that I had found difficulty in getting subscriptions. That is the case. For a considerable number of years I was a Corresponding Member of Council. I often spoke to Officers on the subject and met with the answer, "I am little in London and should get no benefit from it there, and other more practical calls make me spend my spare guineas otherwise than on subscribing to the United Service Institution." In conversation with Colonel Hale, I have often said that the usefulness of this Institution might be very largely extended; and that if members abroad could refer to us for information or assistance, it would bring us a number of subscribers; also that if I or others think that the usefulness of this Institution can be extended, we should try to outline some plan of improvement which I am perfectly certain the Council would take fully into consideration; but that to go to a meeting, whether it is a General Meeting, or an Extraordinary General Meeting, or a Council Meeting, and say, "This is a wretched old Institution, why don't we do something?" is pure waste of time. I wish to set myself right with my colleagues on the Council who might so far have misunderstood what my friend Colonel Hale said to-day as to suppose that I agreed with him in all his suggestions. The fact is I cannot recollect my friend Colonel Lonsdale Hale bringing before the Council any definite and practical scheme containing these proposals. I think that until he, or I, or any others who want to extend the usefulness of the Institution, can bring forward a practical scheme for so doing, it is no use our finding fault with the Council. I have thought over it a good deal, and many plans have occurred to me. I have talked to Colonel Hale about classes and so on, but I have always met with the difficulty that in this house, which we may be turned out of at any moment, we are not in a position to spend money. If any good and practical proposal for extending our usefulness is put forward I will support it.

General FEILDING: I wish to ask a question with regard to finance. Do you want the Treasury to advance sums for the purchase of a building, or the purchase of a site, or do you want it as a loan for the purpose of acquiring a site on lease? It has occurred to me that we have no funds at our disposal for carrying out the very admirable suggestion of the last speaker but one, and that we must go somewhere to get our funds. Of course, unless the Treasury will advance the sums necessary for building such an Institution as we hope to see started, we cannot build, especially not on such a site as is suggested in Piccadilly, but there are many other sites which, though not quite so showy, might be equally useful, and probably might be obtained. I should fancy that we could hardly get further to-day than to appoint a Committee to search into the whole affair, to make alternative proposals, to put themselves in communication with the Treasury as regards finance, and as regards the acquisition of a site, and then to report to the Council.

Admiral COLOMB: Colonel Hale especially asked that some of the younger members of the Council should speak on this subject, and, as no sailor has yet got up to speak, I think, perhaps, I may not be intruding if, on those two grounds, I venture to offer one or two observations. I should like to say, first, that I hope, as I was somewhat instrumental in inducing Colonel Hale to withdraw from the Council before he made this motion, that he will again listen to my second proposal that he should withdraw his resignation, and come back to the Council. I think it was quite necessary that he should withdraw to put himself in order; I am sure we must all feel that, as a member of the Council, he could not have had the free hand that he has taken in this discussion, but I believe that all who have listened to his speech must have seen that he is a most useful member, and always has been and will be a most useful member of the Council, and that we should all regret to lose his services permanently. When he spoke of dissatisfaction existing in the Army on the subject of the Institution, he said he could not speak of dis-

satisfaction existing in the Navy. I can speak quite strongly on the subject of dissatisfaction in the Navy. We are all as dissatisfied as ever we can be, but we do not try to put the saddle on the wrong horse. Our dissatisfaction hangs upon two points, that, on the one hand, the Government keeps us under notice to quit, and, on the other hand, it will not meet us in any proposal we might have in the event of this notice to quit being enforced. The difficulty of doing something which Colonel Hale speaks of, is just that the moment we begin to do anything, some expense must be incurred, and we may find that we have thrown away the whole of our money, because the notice to quit is put in force, and we have to go elsewhere. But the great mass of the proposals made by Colonel Hale are proposals that I must agree with Colonel Matthew Hale in saying did not come before the Council in any complete form so far as I know. They are proposals, it seems to me, which ought properly to have been made in the Council; they are details, and, as far as I know the Council, we should only have been too glad to have had them, and to have worked at them, and to have brought them to a successful issue, one and all of them, if it were possible; but as I listened to his speech I began to think that there were some parts of his suggestions which would require very grave consideration before the Institution embarked in them. Let us recollect that this Institution is a scientific Institution, and cannot well step out of the scientific circle in which it finds itself. It would be a very difficult thing for this Institution, either jointly with others, or by itself, to make itself anything like an agency, except in the scientific and literary way. I quite feel that we ought to be able to answer scientific questions and literary questions referring to the two Services, and if I saw the way I should be very glad if we had that kind of agency; but I am greatly afraid that when we came to make purchases on behalf of absent members, we should find it a very difficult task. An educational centre, I think, is what we ought to be, and I think that is what we all aim at making ourselves. As to classes, I have not heard the proposal before, but I think classes for teaching naval and military subjects might be very advantageously adopted. Colonel Hale gave the Institution the credit, at any rate, of meeting the Aldershot Military Society half-way with regard to the lending library. The lending library is a new arrangement; it has answered well, and there is no feeling on the Council against extending it. As to the museum, I find myself a little in disagreement in the discarding of old things. No doubt, some of the old things might be discarded. There are a great many things in the Institution from which no lessons can be learned, but I should be very sorry indeed to see the museum devoted entirely to the newest things. My strong belief is that you cannot judge of the value of new things unless you have your eye fixed at the same time on the old things out of which they arose. On the whole, all these questions depend upon the matter of accommodation. Colonel Hale has been very industrious in looking up the accommodation at the top of the house, and he laid great stress upon the council room. Well, the council room is not what you call a gorgeous apartment, and it is in use at the present moment as a library. I do not know really why any members who want to use that room when the Council is not sitting, or the Committees are not sitting, should not now use it, but I do not know what they would use it for.

Colonel LONSDALE HALE: Is it told off as part of the library in which members can go and sit?

Admiral COLOMB: I have been myself there to look up the "Army and Navy Gazette."

The SECRETARY: Books and papers are kept there.

Admiral COLOMB: There are some papers kept there which I have been up to look at. Now, when we come to the strong point, which is properly raised outside the Council, namely, that we should adopt some more active policy as regards the Government, I am sure there is not a member of this Council who does not feel that if something is not done quickly, we shall have to adopt a more active policy, but that is with all of us a mere question of time, that if we cannot get in one way a satisfactory answer, we must try some other way of getting a satisfactory answer. I, myself, was originally strongly in favour of a deputation to the Chancellor of the Exchequer, but I found it was not possible to have a deputation which could attract public notice. We found that any deputation that we could

have would be a private deputation, and I agreed then that the course we were pursuing was as good a one as could be adopted. I think Colonel Hale is right in saying we should be ready to accept half a loaf, if we cannot get a whole one. We have put a proposal before the Government, and it is quite open to the Government to make a counter-proposal, and then to negotiate for the half-loaf which we hope to get, if we cannot get the whole one. With Colonel Colville's statement, I think, we all agree. The Institution is "musty, dusty, and fossilized," but how can you help it as long as you are told, on the one hand, that you cannot remain in the place, and told, on the other hand, that there is no other place for you to go to? What on earth are you to do except to stand still as we are? Colonel Matthew Hale spoke of members saying that they could not get any advantages from the Institution when they are abroad.

Colonel MATTHEW HALE: Not no advantages.

Admiral COLOMB: Not a pound's worth of advantages. We are told about having new things in the Institution; is not the "Journal" full of the very newest of new things naval and military? And if any Officer in the naval or military Services wishes to keep himself abreast of the time, there is no way in which he can do it better than by taking in the "Journal" of the Institution. And is not that "Journal" a full answer to any member who says he does not get advantages? Is not it a full answer to him to say that is a very good pound's worth for joining the Institution? You cannot get that amount of information anywhere else for your pound.

Admiral Sir ERASMUS OMMANNEY: I have the honour of belonging to many Institutions, including the Royal Society, the Royal Geographical Society, and the Royal Astronomical Society, but I may say that I get quite as much, if not more, from this Institution for my subscription than I do from any one of those distinguished Societies.

General Sir EDWARD HAMLEY: Only a few words as supplementary to the excellent observations we have heard. I would refer to the appeal to the Chancellor of the Exchequer. A week or two ago there was a meeting of members of the Services in the House of Commons, and they had the advantage of the presence of General Erskine there. It was then that I heard for the first time that the only proposal submitted to him had been the somewhat vague one that we want a building, and we want 36,000*l.* to construct it with. Now I am not surprised that that proposal has not been received with excessive cordiality: something much more definite must be put before the Chancellor in order to obtain his assent. The first thing to be done is to know what premises you want to include in your new building, what accommodation is absolutely necessary, what you cannot do without or obtain in other ways. This should be embodied in a plan drawn up by an architect, and if you have a site in view, let him adapt his plan to that site. Then you will have something definite to put before the Chancellor of the Exchequer upon which to base an estimate, then you will have something definite for your deputation to urge upon him, and then I hope you will obtain some attention to your proposals.

General ERSKINE: Mr. Chairman,—In the course of the observations which have been offered to the meeting this afternoon, I have been alluded to once or twice, owing to the fact that the Council have put into my hands the work of obtaining, if possible, from the Government a site and a building. I begin at the last observation that has been made by General Sir Edward Hamley. As he mentioned just now, I was invited by the Committee of the members of the Army and Navy who are in the House of Commons to attend a meeting to consider the circumstances of the Institution. I gave them all the information which they asked for, and then the question arose whether we had a plan for a new building, and my answer to that was, "No, we have not employed an architect to make a plan of a new building; we cannot do so until we get some definite answer as to a site." I said I considered that it would be wrong to spend the funds of the Institution in employing an architect to make a plan of a building until we actually knew whether we are to have a site upon which to place the building. But it must not be supposed that we have no definite information to give the Chancellor of the Exchequer or to anybody else as to what our requirements are.

In fact, since that meeting at the House of Commons we have placed in the hands of Sir Walter Barttelot, the Chairman of the Committee, the rough plans on which our calculations are made, as well as a statement of all our requirements as to accommodation, and I do not know that the Chancellor of the Exchequer could expect any very definite information from us until he gives an answer to the applications which we have made for some time past. That is where our difficulty lies; we cannot get an answer from the Treasury. We have asked for a site and for a house. We are receiving that assistance from the Government at the present time, as we are paying now only a nominal rent for these premises; and what we have asked the Chancellor of the Exchequer to do is, that when we are turned out of these premises, as we shall be sooner or later, he will provide us with the same assistance which we are receiving from the Government. We ask for nothing more and we hope for nothing less, and we have instanced the fact that when seven other Societies, philosophic and literary or scientific, which were occupying accommodation in Somerset House, were displaced when that building was required for other purposes, the Government actually provided them with accommodation, and we ask to be treated in exactly the same way. Of course we are not such bad men of business, I hope, as to go to the Chancellor of the Exchequer and ask for something less until we get a refusal of what we have asked. If he says that it is impossible to give us the amount of assistance which we require at the expense of the public, then we must adopt some other plan of proceeding, and I for one shall be quite ready to join in any efforts to strike out a new line. But I ask you in the name of common sense not to ask to do anything until we have got our answer from the Chancellor of the Exchequer. To this we consider we are entitled. I will take this present opportunity of thanking, on the part of the Council, which I think I may do safely, the Members of the House of Commons who so kindly interested themselves in our behalf last year. I have heard it said by some of our critics, "We do not believe in Members of Parliament." Well, I do, and I ask any Volunteer friends whom we may have in this room, "Do you not believe in the help of Members of Parliament? Who got for you the vote to supply you with the equipment you considered necessary? Was it not the Members of Parliament who did that?" Therefore I think we are not doing a very bad stroke of business by getting backed by the naval and military Members of the House of Commons, and I hope that in the course of time—of a very short time—they will be able to get an answer, yea or nay, from the Chancellor of the Exchequer. I do not know, after the very able speeches we have heard from members of the Council, that I should go into any other matters. It has been said that we are behind the times in all our work. Now, a very distinguished gentleman in the literary world said a little time ago that our Journal was the very best in Europe—none could touch it. What is that Journal? That Journal is, as I look upon it, a record of our work, and surely if that Journal contains such valuable matter as to entitle it to the encomium of which I have spoken just now, it cannot be said with justice that the Council, who are responsible for the production of that Journal and the work which is recorded in it, are much behind the times. It has been said with regard to the museum that we have nothing in it but antiquities. I quite agree with Admiral Colomb that antiquities are not to be set aside in any offhand way. Of course, if we have nothing in our museum but antiquities it will fall very short of what it ought to be, and no doubt we ought to provide members of the Institution with models of the newest inventions, so far as we can get them; but recollect this is a most expensive business. I have heard it said this afternoon that the War Office and the Admiralty are simply waiting for a demand to supply us with whatever we may want, provided we have space to exhibit it. I am very glad to hear it. Whoever provides these models will have to incur considerable expense, whether from public or private sources. We are doing the best we can in very painful circumstances; we have very bad accommodation here, as you all know, and, moreover, we are under notice to quit. Of course, if the Government were to say, "You shall have the use of this building for a stated term of years," we should know what we were about. But we are under notice to quit; we could be turned out of this place at three months' notice; so that it is not only the poor accommodation that we have

to contend with, but it is also the uncertainty of it, and it would be foolish, I think, for any people who are entrusted with the expenditure of the funds of this Institution to lay them out on these premises when the next day we might be turned into the street. We have asked the Government to help us in our difficulty; we hope for a favourable reply, and until we get a reply I think it would be premature to strike out any new line of working for a site.

General Lord CHELMSFORD, G.C.B.: I rise as one of those Vice-Presidents who have been alluded to by Colonel Lonsdale Hale in not very flattering terms. These old and effete Vice-Presidents, whom Colonel Hale alluded to, are those who have been elected by their own colleagues for having done good service on the Council. Many Vice-Presidents regularly attend the Council, but it is more as honorary members that they do so, and not as an obligatory duty. I think, therefore, it is a little unfair,—although I am sure Colonel Hale did not mean to be so,—that those who are now incapacitated by age or infirmity from attending the Council should be spoken of as if they were neglecting their duty and were bound to attend or to resign. The position of Vice-President is purely a complimentary one, with no duties attached to it. Colonel Hale alluded to some observations made by Lord George Hamilton, and drew attention to those observations as if they were spontaneous on Lord George Hamilton's part. In my opinion they were entirely the consequence of the bitter attack that Colonel Hale made upon the Council at the general meeting. I do not wish to go back on the past, but it was most unfortunate, because it gave Lord George Hamilton an excuse for setting aside what is a very urgent question, viz., the decision as to what is to happen to us when we are turned out of this building. There is one point which Colonel Hale entirely slurred over, and that is the financial position of this Institution. At the present moment you will see that the only *available* balance in hand is 4,300*l*. It is not a very favourable balance, and when we consider that we have got, sooner or later, to move from this site to another, that sum will be swallowed up in the necessary expenses that must be incurred by such a move. I will not trouble you with any further observations, as the whole question has been already very fully discussed.

Colonel Sir LUMLEY GRAHAM: I wish just to make a few remarks on Colonel Lonsdale Hale's speech, which I listened to with the greatest interest, and with a great part of which I entirely agree. At the same time, much as I admire the policy advocated by my friend Colonel Hale, I think he is at times in too great a hurry. I think he wishes to push us on to do things which we really are not able at present to do. I will take upon myself to defend him from some remarks which have been made by subsequent speakers, because, perhaps, according to rule, he may not be able to defend himself, which otherwise he would be perfectly capable of doing. It has been said that he has brought none of the proposals which he has alluded to in his speech before the Council. I have heard members of the Council say that at this meeting, but I am sure that they are not right. I myself heard Colonel Hale bring forward at Council meetings almost all the proposals that he has made this afternoon. There is that very large scheme of his—it may be too large for us to work—I cannot say; but no doubt it is a very fine scheme, that of our being the great agents in educational matters for the Army and Navy. That was brought, I believe the year before last, before the Council. It fell to the ground, owing to some very great practical difficulties, but still it must not be said that he has never definitely moved anything of the sort. I think I may say the lending library is due to his initiative, and I could mention two or three other things, valuable additions to the utility of our Institution, which are due to Colonel Hale. I do not think, therefore, it is fair to say that he has put off until this afternoon the bringing forward in a definite way all the projects which he has now advocated; with reference to what Lord Chelmsford has just said, with regard to the slur that Colonel Hale cast upon the Vice-Presidents, of whom I also have the honour to be one, there is no denying that we are *antiquities*. Of course we are, but I hope we may be of some use yet, and I do not think that Colonel Hale meant to apply any slighting expressions to any of the Vice-Presidents present. I take a different view of the position of these Vice-Presidents to that which Lord Chelmsford has taken. I fancy that I have a vote on the Council as Vice-President, just as much as if I was a member of the Council. I know that I have often

given my vote, and my vote has been received, so that, although I am not nominally a member of the Council, I believe I have all the rights of a member of the Council, and I therefore consider myself responsible for the acts of the Council just as much as any other member.

The CHAIRMAN: The Vice-Presidents are *ex officio* members of the Council.

General Sir LUMLEY GRAHAM: I think I am right in saying that I have the same privileges as other members of the Council.

The CHAIRMAN: Quite so.

Sir LUMLEY GRAHAM: Colonel Lonsdale Hale spoke about the need of greater energy in some respects. I dare say we are not as sharp as we might be in some things; who is? But I think when he spoke of the constitution of the Council, he gave me the greatest possible praise. He gave a sketch of an almost Utopian governing body. He said that we had old members, middle-aged members, and young members. What more can you have? You do not want us all to be old; I am sure you do not want us all to be young, because sometimes the very young are apt to go a little too fast. I should think the mixture of old, middle-aged, and young was a very good element in any governing body. With regard to the site question, that has been fully replied to, I think, by my friend the Vice-Chairman (General Erskine), and I know we are indebted to him for the great exertions he has made in trying to induce the Chancellor of the Exchequer to do something for us. I am sure he will still do his best, and I believe, sooner or later, our Chairman and he will succeed in obtaining what we want, and I quite deprecate, as he did, the idea that the old saying, "Half a loaf is better than no bread," is applicable to the case before us. I say let us stick to the whole loaf, until we are told that we shall not have it; do not let us make any proposal which may make the Government think that we shall be contented with less than the whole loaf, namely, 35,000*l.* and a site. That is what we should have, and I think we should be content with no less. I am sure we have friends in Parliament who will be quite ready to assist us. They have already shown that they are ready, and if they want more definite acquaintance with our wants, they will have it by applying to our Chairman.

Major J. A. BARSTOW: I might mention that in the city of which I am a native there are two institutions, neither of which have the privilege to write the word "Royal" before them, formerly situated in out-of-the-way streets. One of them, leading the van, got the Prince of Wales to lay, with Masonic honours, the foundation stone of a new building in a leading thoroughfare. The other also blossomed out of the obscurity in which it had been hidden, and from a moribund state, they have gradually developed into prosperous educational establishments largely providing for the teaching of middle-class people by means of lectures and evening classes of various kinds. They enter into every branch of education, teaching languages, and even gymnastics and deportment. They may not have quite got over the difficulties they were in originally, but I think we might take an example from them, and by enlarging our educational element obtain increased numbers and influence. I think it would be a great pity to do away with the antiquities we possess, although short of room, and I might suggest that in any rearrangement of arms and armour they should be arranged according to reigns, or centuries, to show their development to the present time.

Captain H. H. GRENFELL: Since these notices have been given out, I have spoken to a great number of my naval friends on the subject, and I should like to point out that there is one thing which seems to be generally felt among the naval members, that is, if it were possible in some way to publish the very valuable papers which are read here at an earlier period than they are at present published, it would to a very great extent increase the usefulness of this Institution. It is felt to be a very long time before we get hold of papers, and very often all interest in the subjects has passed away before we do get them. That is a matter, no doubt, which involves consideration, and no doubt has already received a great deal of attention at your hands. I should wish to emphasize very strongly what my friend Admiral Colomb has said, and that is to hope that the antiquities in this Institution—as they have been called—shall not be done away with; because I think we have a unique collection at the present time, the value of which in many

points of view can hardly be over-estimated. Perhaps there is a feeling of disappointment that more is not done to push the Institution ahead, but when you come into active touch with the method of doing it, one realizes the difficulties which crop up, more especially with regard to the museum and the exhibition of new inventions. I can foresee many difficulties which would arise in making anywhere—it does not matter whether in this Institution or elsewhere—a really efficient and complete collection of the inventions of the day. Colonel Lonsdale Hale would restrict it absolutely to what is new, whereas a good many others think that what is old is equally as important from a practical point of view as the latest novelties.

General GOODENOUGH: Sir, I think the object of a meeting of this kind is rather for the Council to learn the views of the members and to receive, if possible, support and guidance from them—certainly support. I am a member of the Council myself, and with all the friendship and admiration I have for Colonel Lonsdale Hale, and with the great interest with which I listened to his speech, I am not sure that that guidance and that support would be best given by a resolution in the direction of that which he has proposed. I gave careful attention to the words, and, as far as I can judge—I have not seen the resolution in writing—it seemed to me that it was a resolution calling on the Council to proceed more actively in attacking the Chancellor of the Exchequer with the view of acquiring the increased accommodation spoken of; but I think it does not give any guidance as to how and in what manner the Council should proceed, or what their policy should be. After all the discussion that has taken place to-day, I really am left very much in the same position that I was before we assembled. It appears to me that there are two views prevalent, and the question is, which of those views are we to follow; are we to stand still and wait for what the Chancellor of the Exchequer will do for us, or are we to act vigorously to show him our vitality, and so prove to him the necessity of yielding to our demands? I believe the latter course is substantially what is desired and what commends itself to the members. I have said I am a member of the Council, and it is not perhaps disclosing too much of the secrets thereof to say that we had a meeting to-day at 2.30 before this General Meeting began, and it then appeared that in bringing forward those four points which are printed at the bottom of the paper which has been read, there was some little doubt as to whether it was intended that all the action there proposed by the Council for the future was to be taken in any measure now, or whether the whole thing was not to be postponed until that fortunate moment when we might get a new building. I think it would be appropriate, as there was a doubt in the minds of some of the members of the Council, that that doubt should be set at rest. So far as I was able to ascertain in the very short time I had available in which to submit to my colleagues a resolution which would enable that question to be set at rest, I believe it gained their favour; certainly I had your permission to put it to the meeting. I will just read it for the sake of clearness.

The CHAIRMAN: We have a resolution before the meeting now.

General GOODENOUGH: I have said quite enough to show that I have put down on paper something to express my view. I was going to have read it out and then to have sat down, but if you prefer to leave it [Read! read!] I do not want to put it as an amendment at present.

The CHAIRMAN: Then I think you would be more in order if you rose again presently.

General GOODENOUGH: I thought it was just within the bounds of possibility, although I know that he is strongly wedded to his own opinions, that my friend Colonel Lonsdale Hale might concur with it. I do not think there would be any objection to reading it. What I had intended to do was to read it, to sit down, and to let the other motion go forward. If the meeting hold by it well and good, but if the other motion was rejected I intended to ask your leave to propose this as a substantive resolution.

The CHAIRMAN: I will ask the meeting if they would like to have it read.

[Agreed.]

General GOODENOUGH: "That this meeting supports the view that whilst maintaining our demands for a new building, no efforts should be spared by the Council to increase the vitality of this Institution and to develop its usefulness, so far as

this is not dependant on the acquisition of additional accommodation, and as funds can be made available."

Admiral Sir E. G. FANSHAWE, G.C.B.: I am one of those Vice-Presidents that have been referred to, and I have generally attended the Council for some years, and I am as convinced as I can be of anything, that the Council has done with all its might,—limited only by the prudence which men of business exercise in managing financial affairs,—exactly what that resolution proposes; and I do not see how the Council can do more than they have done in forwarding the settlement of this long-pending, anxious, and difficult question. I do not believe that more could be done.

Admiral SELWYN: I think the most useful suggestion that could be made at the present moment would be anything that would help forward the action of the Council with General Erskine, that being the line of action which I think is the only possible one at the present moment. He has secured the support of the naval and military Members of the House. What we want, and what they want, what the Ministry wants, what everybody wants, is the support of the public. If we can get Colonel Lonsdale Hale, or any other skilful wielder of a pen, to put before the public the enormous advantages that have accrued to the nation from the existence of this Institution, and the discussions which have gone on here, and the still far greater advantages in absolute money value which would have accrued had the suggestions of this Institution on many subjects within the last twenty years been listened to and weighed, as they should have been, as the expressions of the opinion of the two professions, by which means it is not too much to say that many millions would have been saved—were it known to the public that Ministers did rely upon opinions from this Institution as expressing the opinions of the two Services—if the nation became aware of that, the constituencies would push the Members, and the Ministers would, with the greatest pleasure, grant anything that the Institution may reasonably require. If the Members cannot be convinced themselves, but will take the trouble to convince others, that these views are true, that if they had been accepted we should not have spent money in vain, that an enormous expenditure would have been saved, no cataclysms and panics could have occurred, and the nation would have had full value for its expenditure. As it has been in the past so we hope it will be in the future, that matters will be discussed here without fear or favour to anybody, be he Minister or the meanest man in the two Services—as long as we stick to that principle we should gain all the support we want. Under these circumstances, I think the action taken should be a little further instruction to General Erskine by the Council, who would be justified in doing all that is necessary to attract the public attention on the subject. As we have so many Gold Medallists and such able writers among us, I am quite sure that if they will only take the pen in hand they will easily get the papers to publish what they write, and we shall then find no Minister hard enough to refuse what we are reasonably asking. But every institution, and specially those of the two Services, must always keep in mind that while the truth may be, and often is, worth millions to the nation, subserviency and servility are not worth anything except, perhaps, to those individuals who practise such arts, *and only to them*, while their mode of action remains undetected.

Sir JOHN COLOMB, M.P.: I am not precisely clear whether that is considered to be an amendment or whether it is not, whether we are discussing the original resolution, or whether we are discussing the resolution of the gallant General.

The CHAIRMAN: We are now discussing Colonel Hale's resolution; there is no amendment.

Sir JOHN COLOMB, M.P.: I only rose to a point of order. I desired to make some observations upon General Goodenough's resolution, but I wished to know, on the point of order, whether it is before us.

Captain JOHNSTONE, R.N.: As no Officer of my standing in the Navy has addressed the meeting, I may venture to do so. A great many military Officers have spoken, and, perhaps, the meeting would also wish to hear some views from a naval Officer. I think a great deal that has fallen from Colonel Lonsdale Hale would certainly be approved of by the younger portion of the profession in the Navy as well as in the Army. The great point is that the Institution should keep itself up to the

requirements of the times, and I think it is an undoubted fact that the young Officers of both Services do not think that it does so. I have recommended Officers who have served with me to join the Institution, and I could not find any disposition in them to do so. I think the advantage of the Institution is unquestionable; but I think the great advantage lies in the Journal. The Journal, possibly, is not read very much. It is supplied to every man-of-war, but I do not think it is very much read. The practical point is how we can induce the young Officers of both Services to take more interest in the Institution. It does seem to me that is the point. It does not appear to me that the Government recognizes the advantage of the Institution. As has been remarked already, its value to the public services is immense. It is the only place that I know of where important naval subjects are fully discussed and thoroughly examined. The Journal is the only publication that I know of where these matters are brought forward in concise form, and I attach the greatest importance to the discussions that here take place. I think the opinions expressed by Officers of both Services, Officers of weight and whose names are known, are even far more important than the papers themselves. The question that rose in my mind is: Can we bring home to the Government the importance of the Institution? The question at the present moment is: Is the Institution prepared to shut up entirely? Because the moment the Government says that we are actually to move, the whole of the valuable museum will have to be packed up; and I believe when once the museum is packed up, probably there will be an end of it. I look upon the museum as a very valuable part of the Institution, not necessarily the oldest part of it; but I think there are many parts of it that are extremely useful for historical and other purposes, and I believe the practice of the present day must certainly be founded on history. What I should like to know is whether the question has been fairly placed before the Government: "Is this Institution to cease to exist, or are they to give assistance?" I think this is the position the Institution ought to take, that the Government should either assist it, or it should shut up as a scientific society. I think on every account it is desirable that it should remain a scientific society rather than become a sort of club, and I think to do that, the Government certainly ought to assist it. I submit that the Council should put before the Government, through Members of Parliament, that assistance must be given, or that this valuable Institution, which is of such use to the country, must close.

General Sir Beauchamp Walker: I should like to say one word on a personal matter, and that is as regards the Journal. Although I have not been all my life on foreign service, yet, until I returned to England twelve years ago, I had hardly ever been in London, or had an opportunity of participating in the advantages of this Institution. I do not think that we are, all of us, awake to the fact that the subscription to this Institution is a very low one. When I first subscribed it was 10*s.*, then for another 10*s.* one obtained the Journal. After all it is only 1*l.* I do not think there is any other scientific institution in London in which the subscription is less than two guineas. Therefore, I feel that I am justified in saying that we get a great deal for our pound. I can only say that during the twelve years that I held a very responsible position in Germany I found the Journal of this Institution of so great value that I would willingly have given a pound a number for it. Until the appointment of a Naval Attaché to the Embassies on the Continent, I used to have naval questions referred to me in Berlin constantly; most of those, particularly as regards anything in the Navy, I was able to put at the disposal of my friends by referring, as Captain Johnstone has just said, not only to the lectures, but the discussions, and the discussions I really believe to be the most valuable part of the whole Journal. I, therefore, should be very sorry that the discussion as to the merits of the Institution should have passed away without my bearing testimony to the very great advantage I derived professionally from the perusal of our Journal as it then existed. The Journal has been very much improved since then, because there are notices of new books, and there are also contributions from other persons beyond the lectures, which are very valuable. I have very great pleasure in bearing testimony to the very great value that one gets for one's money.

Colonel Lonsdale Hale: May I make one or two remarks in reply? First of

all, I want to apologize to the Vice-Presidents. I did not wish to say anything to the Vice-Presidents, but simply to say that on that list there are no doubt men who, through their old age and other matters, are not able to attend and give the Council the benefit of their views. Then, as to the statement that I made vague and indefinite proposals, I thought mine were anything but vague; I thought that every suggestion was clearly defined. And with regard to not having put them before the Council, I think, perhaps, in the seven and a half years that I have been on the Council these things have been brought before them from time to time, though they have not received that amount of support which I think they might have done. I do not think it will be necessary to say anything more upon the whole question, because we have had such a declaration from the Vice-Chairman, General Erskine. I hope I do not put him down wrongly, but he first of all told us we had a dozen notices to quit which had never been carried out, and then he said that as we were under notice to quit it was premature to strike out any new line of work. That is the whole thing that is the difference between myself and those who think with General Erskine. Are we going to wait until we get rid of these notices to quit, until we get the new building, or are we going to act at once?

General ERSKINE: Until we get an answer.

Colonel LONSDALE HALE: When shall we get an answer? The policy I advocate is, let us do something at once, and not wait until we get the answer. I have nothing more to say.[1]

The CHAIRMAN: Before putting Colonel Hale's proposition to the meeting, I think it is incumbent on me to make a few remarks on some of the details. I should like to observe that in the way the resolution is put it may bear the interpretation to the outside world, and to many members at this meeting, that it conveys more or less an attack upon the Council, or as a want of confidence in the Council. I may say I think that that is not Colonel Hale's intention. His intention is to spur us on, and to give effect to any proposal the Council may make for improvement; but, whilst urging a more active policy than at present prevails, I think he is a little severe upon the Council, and I do not think that he has correctly indicated the present position of affairs. Some of the proposals made by Colonel Hale I perfectly agree with. The question of the corresponding members has certainly been brought before the Council.

Colonel LONSDALE HALE: I must specially ask if I shall have the opportunity of replying to any observations that you are making now?

The CHAIRMAN: I do not think they will require it.

Colonel LONSDALE HALE: I have replied, and if any statement is again made by the Chairman of the meeting I can only say that is not the practice carried out at other meetings.

The CHAIRMAN: You have heard Colonel Hale's observations. My remarks will be very plain and simple. I do not think he will find any occasion to controvert what I have to say. I think as Chairman of the meeting I am bound to give an opinion on the subject. With regard to corresponding members, certainly there are instances of corresponding members who have been corresponding members —I do not know how many years—who have never corresponded at all, and that matter, no doubt, the Council will take up and consider. Then there is again a point about supplying information, and the Institution being a sort of agency for Officers of the Services. Well, we must remember that we are receiving 600*l.* a year from the Government at this moment, and if we are to carry on such an agency as that which has been implied, or to become of the nature of a club which has been referred to, I think we should not get the support of the Government, and that we should not receive the 600*l.* a year which we are enjoying at present. You will find a paragraph (9) in the last Annual Report to the following effect, that: "When inquiries on naval and military professional subjects are received

[1] A member of Council stated I had slurred over the question of expense. I certainly meant to imply that the increase of members resulting from increased activity would repay the expenses incurred.—L. A. H.

from members, endeavours are made either to furnish the information sought for, or to point out where it can be obtained." With regard to the museum, Colonel Hale has requested members to go through the building, with a view to a thorough rearrangement, but I do not think any satisfactory arrangement can be made under existing circumstances. In the council room, for instance, there is very little space, and it is very inaccessible. We have within this month or two made a re-arrangement of one of our rooms, the topographical room, and we have established a reading and writing room, where members can smoke and obtain light refreshment. Even that has cost the Institution about 74*l*., so that it is clear none of these proposed changes can be made without some considerable expenditure of money. Also as regards the "Journal," the success of which is partly owing to Colonel Hale's connection with it. It has been proposed to the Council that there should be a monthly instead of quarterly issue of the "Journal," and that question is under consideration. The "Journal" is supplied to the library of every ship in the Navy, much to our advantage. Then a reference was made to the exertions made by the Council in 1858 to reorganize the museum. I wish we could imitate them, but the thing is that they were not under notice to quit as we are; they could lay their money out and get a benefit from it, which I am afraid is a very doubtful matter in our case. As to the information that has been asked for about our new requirements, I may refer to the statement that has been sent to the members of the Military Members' Committee of the House of Commons, viz.:—

"The principal requirements for a new building are as follows:—

"1. A theatre capable of containing 700 persons, with an ante-room in addition.

"2. A library capable of holding at least 25,000 volumes. The present library contains over 23,000 volumes, and increases at the rate of about 200 volumes a year.

"3. A topographical room for maps, charts, &c., &c.

"4. A museum capable of holding all new models and inventions connected with the Services, in addition to those already possessed.

"5. Two rooms for reading and writing.

"6. Council room.

"7. Secretary's offices.

"8. Librarian's office.

"9. Clerk's office.

"10. Librarian's quarters. (It has been found from experience that the Librarian should reside on the premises.)

"11. Housekeeper's quarters.

"12. Resident porter's quarters.

"13. Kitchen and dining-room for clerks and attendants. (They are compelled to take their midday meal on the premises.)

"The rough estimate of the above is about 32,000*l*.

"Should the scheme for the accommodation of the Royal Engineer Library, as mentioned in the Memorial, be finally approved of, 2,500 square feet of library accommodation will have to be added to the above."

What I want to impress on you is, that the Council is not quite so dilatory as it would seem to be implied, that we are endeavouring to do something; and the whole question to my mind rests upon this: whether it is worth our while to expend money in this building as it now exists, or whether we should wait until we get something more definite as to our future. As regards models, that is a very difficult and important question; good models are most expensive things. We have a model on loan in our naval model room well worth inspection which is valued at 500*l*., that is, the model of the Italian cruizer "Piemonte." We lately made enquiry as to a working model of the breech arrangements of a breech-loading 12-inch gun, and the estimated cost of such a model is from 150*l*. to 200*l*. These things require a great deal of consideration, and we cannot go into them now. I will now read a note put into my hands just before I came to this meeting, from the present Director of the Naval Intelligence Department, Captain Cyprian Bridge: he says, "I intended to be present at the meeting to-day. I send you a line to say that I would, had it been possible, have said this to the members of the Institution, that even during my short experience of an official position at the Admiralty, I have

several times found it necessary to have recourse to the assistance of the Royal United Service Institution when in search of information on important points."

I will now put the motion proposed by Colonel Lonsdale Hale, and seconded by Lieutenant-Colonel Colville.

(The resolution was then put from the Chair, when 45 members voted in its favour, and 27 members against.)

The CHAIRMAN: I have to declare the resolution carried. I think General Goodenough may now be permitted to put his motion.

General GOODENOUGH: The other motion having been carried, my motion becomes of no importance.

The proceedings then terminated.

NAMES OF MEMBERS who joined the Institution between the 1st July and the 30th September, 1890.

## LIFE MEMBERS.

Long, S. C., Lieut. 7th Bn. King's Royal Rifle Corps.
Bulkeley, Sir Richard H. W., Bart., Lieut. Royal Naval Arty. Vols.
Norton, C. E. G., Lieut. 7th Hussars.
Tebbutt, L., Lieut. 3rd V.B. Suffolk Regt.
Pilcher, T. D., Capt. 1st Northd. Fus.
Leggett, E. H. M., Lieut. R.E.

## ANNUAL SUBSCRIBERS.

Molyneux-Montgomerie, G. F., Lieut. Gren. Gds.
Lascelles, W. E., Lieut. Rifle Bde.
Granet, E. J., Capt. R.A.
Cole, A. W. G. L., Capt. Rl. Welsh Fus.
Powys, J. L., Lieut. Oxf. Light Inf.
Tighe, M. J., D.S.O., Lieut. Bom. Staff Corps.
Monro, C. C., Capt. 1st Rl. W. Surrey Regt.
Dickson, W. K., Lieut. 1st Midlothian Arty. Vols.
Cassels, K. S., Lieut. 1st Hampshire Regt.
Gartside-Tippinge, V., Capt. The Rl. Scots (Lothian Regt.).

# OCCASIONAL PAPERS.

**This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.**

**It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.**

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## COLONEL v. LÖBELL'S[1] ANNUAL REPORTS UPON THE CHANGES AND PROGRESS IN MILITARY MATTERS DURING 1889.

Compiled by Colonel H. HILDYARD.

IF, as may be inferred, the success of a periodical publication is to be gauged by the bulk of interesting matter to be found year by year in its pages, Colonel v. Löbell must have every reason to be satisfied. In the preface to his sixteenth annual issue he explains how, owing to the abundance of matter at his disposal, he has been forced to adopt for this issue a special form, and publish it in two parts.

A reference to Part I shows how necessary this course is, for, notwithstanding that it treats exclusively of the individual armies of the world, it reaches the respectable size of 652 pages. This has its disadvantages, and it is with some sense of relief we read that the compiler regards this as an exceptional arrangement, and intends to revert in future issues to the more manageable form of past years. It is a part of the scheme of this work that, besides noting the various changes in organization and training as they occur, there shall from time to time be a comprehensive description of the armed forces of each of the greater Powers. This year it is the turn of the Russian Army, which monopolizes no less than 128 pages—a volume in itself.

Of the remainder, nearly 300 pages are pretty equally divided amongst the European States. Beyond the seas, the Argentine Republic, the armed forces of which have been so lately in request, heads the list with 55 pages, and, belonging to the same continent, Chili comes next. The second part comprises interesting papers on the tactics of the several arms, on fortification, military telegraphy, &c.

### *Germany.*

The first event of importance during 1889 was the re-naming on the Emperor's birthday (27th January) of regiments and battalions of the

[1] "Jahresberichte über die Veränderungen und Fortschritte im Militärwesen," 15 Jahrgang, 1889, herausgegeben von H. v. Löbell, Oberst z. Disp.—Berlin. Ernst Siegfried Mittler und Sohn. 1890. 2 vols. Pp. 996; size, 9·5″ × 6·5″ × 2″; weight 3 lb. 6 oz. Price 15*s*.

Prussian Army, after members of the reigning house and distinguished soldiers who had served them, such as Gneisenau, Kleist, Schwerin, Keith, Horn, Scharnhorst, and Seydlitz in an earlier generation, and Steinmetz, Goeben, Werder, Voights-Retz, and Manteuffel later. After the Emperor's visit to England a special order was issued nominating the 1st Dragoon Guard regiment to the title Queen of Great Britain and Ireland.

*Artillery placed more directly under the General Officers Commanding.*—By a Ministerial Order, dated the 14th March, the field artillery brigades were placed under the General Officers Commanding. The Inspector-General and the four Inspectors of field artillery were done away with. One Inspector —a Lieutenant-General—was created, to superintend the technical training and inspection of the field artillery.

To carry this into effect the following instructions were issued in May :—

1. The field artillery is placed under General Officers Commanding, as regards its tactical training and power of manœuvring, for organization, mobilization, and personal matters. They are equally responsible for this arm being in a fit condition to take the field as they are for the infantry and cavalry.

2. The General Officers Commanding are to inspect the field artillery, when making their annual tours, in manœuvring as in war, and in firing with shot on the practice grounds.

3. The Inspector of Field Artillery has, in accordance with the instructions he receives from the War Office, to watch over the technical matters connected with the field artillery. He conducts especially the instruction in firing, so far as the technical part is concerned, and he sees that the Officers keep up and improve their technical knowledge. If he considers changes to be necessary in the regulations connected with the field artillery, he is responsible for submitting them to the War Office.

4. The examinations for Captains and First Lieutenants are abolished.

5. The Inspector of the field artillery inspects it, as a rule, every two years on the practice grounds. The dates for this are fixed between him and the General Officers Commanding, and are then approved by the War Office. He generally attends the Great Autumn Manœuvres of those Army Corps that have Emperor's Manœuvres. If he considers it desirable to ascertain the working of the field artillery at the Autumn Manœuvres of other Army Corps, he applies to the War Office.

6. The Inspector has the same authority at the School of Gunnery as the former Inspector-General.

7. The practice grounds are under the General Officer in whose district they are situated.

8. The Inspector of Field Artillery is the President of the 1st Section of the General Artillery Committee, and belongs to the managing body of the combined Artillery and Engineer School. He is authorized to attend the sittings of the Artillery Board of Examination.

9. The arranging, on the application of the brigade commanders, with the concurrence of General Officers Commanding, for the detaching of field artillery Officers to the School of Gunnery, the combined Artillery and Engineer School, and the Technical Institutes.

10. He may communicate direct with the field artillery brigades on technical subjects. He has to acquaint the General Officer Commanding with all orders of importance affecting the war efficiency of the arm.

11. He makes a short report to the General Officer Commanding on the result of his inspections. These Officers, in making their own inspection reports to the Emperor, have to append this report. The Inspector, when sending his reports to the General Officer Commanding, is justified in remarking upon any points that have come under his notice when making

his inspection, though not connected with his special branches, and making propositions in regard to them. The General Officer Commanding decides on these proposals, unless they involve the alteration of existing regulations or of matériel: in these cases they have to be submitted at once to the War Office.

12. The promotion lists and the personal and qualification reports on the Officers of the field artillery brigades are submitted through the General Officers Commanding. The reports, however, go in the first instance from the brigade commanders to the Inspector, who may add his remarks.

13. On the conclusion of each inspection year the Inspector makes a comprehensive report upon his observations to the Emperor. A duplicate is sent to the War Office, whence extracts are sent of what concerns each General command.

*War Office.*—From the 1st January, 1890, the following changes were made in the organization of the department, and a new branch (small-arms) created as a provisional measure.

The General War Department now consists of—

*The Army Section* (formerly the same title).—Its special functions are, the organization of the Army in peace and war; preparation of the 24th chapter of the estimates for permanent expenses; recruiting; matters connected with the men dismissed to their homes on furlough, and the Landsturm; the great manœuvres and exercises of the Ersatz Reserve; distribution; railways; roads and waterworks; matters connected with the lines of communication; military conventions; special services of the General Staff, including surveys.

*The Section for Foot Troops* (formerly Infantry Section).—Special matters connected with the infantry, jägers and rifles; with the foot artillery, pioneers, railway troops, and balloon sections; infantry establishments; garrison schools; army music; garrison duty, &c.; education of the troops; general matters connected with the practice grounds of foot artillery; military education and training (including the combined Artillery and Engineer School); the completion of the peace establishment of Officers; military libraries; literary matters; statistics.

*The Section for Mounted Troops* (formerly Cavalry Section).—Special matters connected with the cavalry, field artillery, and train; military school of equitation; veterinary matters; police; field jägers; postal services; general affairs connected with field artillery and combined practice grounds; management of business in the army; printing estimate.

*The Fortress Section* (formerly Engineer Section).—General matters connected with the Corps of Engineers; fortress warfare; armament, construction, and maintenance of fortresses; explosives; electricity, telegraphs, and lighting; telegraphs with the troops; mining, bridges, and tunnels; pigeon post; telegraph schools; school for military engineering.

The provisional *Arms Department* has the following branches:—

*Small-arms Section* (provisional).—Small-arms; small-arm ammunition; armourers.

*Gun Section* (formerly the Artillery Section of the General War Department).—Foot and field artillery matériel; artillery ammunition; field tools for the army (exclusive of the pioneers and railway troops): matériel for exercises of the train; artillery and train depôts.

*The Technical Section* (formerly the same title).—Matters connected with the Technical Artillery Institute; funds for sick; insurance against accidents.

Simultaneous with these changes in organization, it was ordered that the administration of the stock of tents, camp and cooking equipment, should be transferred from the General War Department to that of Military Economy.

*Distribution of Recruits.*—The annual contingent of recruits for 1889 was distributed in the following proportion :—

| | |
|---|---|
| To each battalion of infantry on the higher establishment..... | 230 |
| „ „ lower establishment ..... | 200 |
| „ jägers and rifles ..... ..... | 190 |
| To each regiment of cavalry, at least ..... | 150 |
| To each horse artillery battery on the higher establishment, at least ..... | 35 |
| To each horse artillery battery on the lower establishment..... | 25 |
| „ field battery on the higher establishment ..... | 35 |
| „ „ „ lower establishment ..... | 30 |
| „ battalion of foot artillery on the higher establishment | 200 |
| „ „ „ lower establishment | 160 |
| The Guard pioneer battalion ..... | 210 |
| Other pioneer battalions ..... | 164 |
| Each battalion of the railway regiment, at least ..... | 135 |
| The balloon section, at least ..... | 15 |
| Each company of train— | |
| Men serving for three years with the colours ..... | 15 |
| „ six months only ..... | 38 |

*Inspection of the Troops.*—In an order dated the 31st March, 1889, attention was called to the fact that the contents of the new Infantry and Field Artillery Drill Regulations have been brought into conformity with those for Field Service, with a view to all training having for its object the preparation of the troops for war.

The method and manner of the inspections are of decided influence on the troops. An excess of inspections has a narrowing influence : where their object can be attained without setting aside special days for inspection, this should be arranged, so as to economize time. Successive inspections of the same branch of the Service by different Officers is to be avoided by arranging that these Officers arrive at the same time.

The inspections must be appropriate to the particular arm, with a view to testing the efficiency of the troops for war. If by the time and manner of the inspections importance is given to formal training, the commanders of the inspected troops will be led not to regard anything beyond this, and will not be properly judged in regard to their own capacity. Such a period, therefore, is to be chosen for the tours of Commanding Generals through their districts that they may have an opportunity of judging of the training of the troops for war in every possible direction.

Finally, it is ordered that at every inspection in the training of troops in fighting formation, the commander is to be given a scheme by the Inspecting Officer, and, so far as space allows, there is to be a marked enemy. Every inspection day is to be a real exercise day for the troops.

*Annual Staff Tours.*—Fresh instructions were issued early in the year respecting annual tours to be made by Officers of the General Staff.

These are of three kinds :—

The great General Staff tours.
The corps „ „
The fortress „ „

The ordering, duration, and extent of these are arranged by the Chief of the General Staff of the Army, within the limits imposed by the means available from the estimates, and following the lines laid down in the instructions on the subject.

*Great General Staff Tours.*—These are conducted by the Chief of the General Staff of the Army, and the Officers employed belong for the most part to the General Staff, including those attached from the Bavarian, Saxon, and Wurtemberg General Staff. Besides these, 2 Generals, 2 Commanders of regiments, individual General Staff Officers of the command, and 1 or 2 Intendance officials may be attached. 2 cavalry non-commissioned officers and 4 men are detached as mounted quartermasters, also 1 infantry non-commissioned officer and 5 men as orderlies. The duration varies; it depends on the general idea, the limits imposed, and the means available. It is ordinarily about 21 days.

*Corps General Staff Tours.*—As a rule, tours take place annually in nine Army Corps, under the direction of the Chief of the Staff of the Corps concerned. The command of those taking part in them rests with the General Commanding. All the General Staff Officers, including those doing duty in fortresses, belonging to the Army Corps take part in the tour, also 1 Officer of the Intendance. Other Officers of the infantry, jägers, cavalry, field and foot artillery, and pioneers are taken in proportion as their branch is represented in the Army Corps. They are estimated according to the number of units—companies, squadrons, batteries—1 Officer being detailed for every 16 units.

Out of 3 or 4 detached Officers, 2 are Field Officers; when they number 13 or more, then 3 are Field Officers. The remainder are to be preferably half Captains and half Lieutenants. Instructors at the war schools are also attached under special arrangements. The duration of the tours is ordinarily 17 days, including marching and returning. The area embraced is restricted to the Army Corps region.

*Fortress General Staff Tours.*—Generally there is a fortress tour annually in one Army Corps. The Officers who participate in it are the following:—

Directing the tour: The Chief of the Corps General Staff; a Field Officer of the General Staff, the foot artillery, and the engineers; an Intendance official.

Representing the attack: A Field Officer of the General Staff as commander; a Captain of the General Staff; a junior Field Officer or Captain of foot artillery and of engineers; a Captain or Lieutenant of pioneers and of infantry.

Representing the defence: A Field Officer of the General Staff as commander and other Officers as in the attack, except that there is not a pioneer Officer.

Exclusive of the journey to and fro of the Officers attending, the ordinary duration of the tour is 10 days.

### *Belgium.*

*Organization.*—A law dated the 23rd June, 1889, made some alterations in the peace organization and strength of the Army. It is to consist of the following:—

*Infantry.*

1 regiment of carbineers.
1 regiment of grenadiers.
3 regiments of rifles.
14 line regiments.

The carbineer regiment has 4 active battalions and 3 reserve battalions. The other regiments have each 3 active battalions and 2 reserve battalions. The battalions have each 4 companies.

Each regiment has a depôt, consisting of a Staff and 1 company.

There are further 2 sedentary companies, 1 disciplinary corps of 6 companies, and 1 army pupil school of 2 companies.

*Cavalry.*

2 regiments of mounted rifles.
2 „ guides.
2 „ lancers.

The whole of the regiments have 5 active squadrons and 1 depôt squadron. These depôt squadrons have been introduced by the new organization, and the rank of Second Captain has been abolished.

*Artillery.*

8 regiments, of which 4 are field and 4 fortress.
4 special companies, viz., pontoon, laboratory, artificers, and armourers.

The 1st and 3rd Field Artillery Regiments each consist of 8 batteries, 1 reserve battery, 1 reserve battery for horsing 2 ammunition columns, and 1 depôt battery.

The 2nd and 4th Field Artillery Regiments consist of 7 batteries, 2 horse artillery batteries, 2 reserve batteries, and 1 reserve battery for horsing 3 ammunition columns, and 1 depôt battery.

The active field batteries have each 6 guns horsed.

The 5th, 6th, and 7th Fortress Regiments have each 14 active batteries, 2 reserve batteries, and 1 depôt battery.

The 8th Fortress Regiment has 16 active, 2 reserve, and 1 depôt batteries.

The new organization has abolished the rank of Captain 2nd Class; it has introduced depôt batteries in the field artillery, 10 reserve batteries (of which 6 for the fortress artillery), 10 active fortress batteries, and the Staff for a new regiment (No. 8). The grouping of batteries was changed from 2 to 4.

*Train.*—1 regiment of 2 battalions and 1 depôt company. The 1st battalion has 3 companies; it horses the vehicles of the 1st Army Corps.

The 2nd battalion has 4 companies; it horses the vehicles of the 2nd Army Corps and the Army Headquarters.

The new organization has converted the previously existing train battalion into a regiment of 2 battalions, and created 1 new company.

*Engineers.*

1 regiment of 3 active battalions, each of 4 companies, 1 reserve battalion of 4 companies and 1 depôt.
5 special companies, viz., railway, field telegraphs, fortress telegraphs, explosives, artificers.

*Police.*

3 divisions of 3 companies.

*Peace Strength.*

| Arm of the Service. | Officers. | Men. |
|---|---|---|
| General's list | 33 | |
| General Staff | 46 | |
| Administrative services | 262 | 869 |
| Medical service | 222 | |
| Staff of provinces and garrisons | 39 | |
| Infantry | 1,745 | 28,810 |
| Cavalry | 304 | 5,744 |
| Artillery | 534 | 7,907 |
| Engineers | 146 | 1,433 |
| Train | 29 | 402 |
| Total, exclusive of police | 3,360 | 45,165 |

The increase by the new organization was 77 Officers and 542 men, about half of which to the artillery. These numbers show that as a regular reorganization of the Army the measure is not to be taken seriously. In adopting it, the military opinions were not regarded.

*The Fortified Position of Antwerp.*—The credit of two millions of francs, voted for changes in the works, was founded on the following considerations :—The assailant of a fortress in the present day will have at his disposal such powerful means of destruction as to necessitate the strengthening of the vaulted roofs and walls of defensive works and the employment of new materials in their construction. The credit voted will further allow of the completion under the new conditions of the forts of Rupelmonde and Schooten, and of the redoubt of the railway from Wawre Saint Catherine.

Five works are in course of construction : the fort of Rupelmonde, which will soon be ready, the railway redoubt, the fort of Schooten, and the redoubts of Beiendrecht and Oorderen, destined for the defence of the maritime zone on the right bank of the river.

The Rupelmonde fort is to defend the bridge-head at Wintham, in support of an Army Corps of the Field Army from Antwerp, operating on the Durme, and to bar the passage to gunboats which might be sent up the stream. The dry ground between the dykes of Fingene and Eycklevliet must be withdrawn from the inundation with a view to offensive returns on the left bank. To facilitate this, a bridge must be thrown over the Scheldt, opposite to Rupelmonde.

The advanced forts of the Antwerp position will be strengthened by a shield of beton cement, 1½ metres thick, being placed over the masonry, and by the most important guns being placed in towers.

Specialists consider that a further expenditure of 34 millions of francs for the completion of the Antwerp defences is unavoidable. It is a question—

1. Of the construction of a new girdle of works with towers in front of the existing line of forts.

2. Of the strengthening of the defensive position of Nethe by four new redoubts.

3. Of the construction of two further redoubts at Ouden Doel and at Doel to participate in the defence of the maritime zone.

4. Of the definite organization of the forts on the Lower Scheldt.

*The Works on the Meuse.*—A new credit of 12 million francs was taken, and everything leads to the hope that the works will be completed early in

1891. The works are distant from one another 2,500 to 3,500 metres, and pushed forward from 6 to 9½ kilometres from the centre of the town. Each fort is to contain a garrison of one company of infantry and a battery of artillery; the form is to be three-sided or four-cornered, according to the situation. There are to be towers at the salients, in the middle of the faces, and the centre of the fort. The ditches will be flanked by the fire of machine or quick-firing Nordenfelt guns placed in the salients of the counterscarp, and worked by one gunner. Certain types of fort can have a redoubt containing a central tower.

The town of Huy will be defended by a barrier fort on the bastion system with casemated battery.

*Armament.*—The pattern of magazine rifle adopted is the Belgian Mauser, 1888. The magazine is detachable and holds five cartridges.

The three first regiments of field artillery have already received their new Krupp matériel, with which artillerymen are satisfied.

The armament of the Antwerp position comprises rifled guns, steel, bronze, and cast iron, and even smooth-bores. For the more distant defence the Government have acquired a number of rifled steel 15-cm. guns, whose accuracy, penetration, and range are remarkable.

The necessary funds for the further preparation of the armament for the forts to be constructed on the Meuse was voted. It will consist principally of steel 12-cm. guns, 21-cm. howitzers, and quick-firing Nordenfelt guns.

The number of the armoured towers to be provided is 147, of which 93 will be furnished from the Gruson works.

*War Organization of the Troops.*

1. The Field Army, 2 Divisions of cavalry, 2 Army Corps, each of 2 mixed Divisions.

2. The fortress troops, consisting of those destined to the mobile defence of the greater fortresses, those for the actual defence, and those for the service of the large military establishments, besides depôts and sedentary companies.

3. The territorial gendarmerie.

*Infantry.*—The regiments join the Field Army with their 3 active battalions. The new battalions of the Reserve (1 per infantry and carbineer regiment), commanded by the Major of the depôt, and the regiments of the Reserve, formed from the non-active battalions, commanded by the Lieutenant-Colonel; 1 carbineer battalion is allotted to each mixed Division.

*Cavalry.*—The 4 first squadrons of each regiment form a regiment of the first line.

The 5th squadrons of the mounted rifles form the cavalry of the 1st Army Corps, the 5th squadrons of the Guides that of the 2nd Army Corps of the Field Army. The 5th squadrons of the 4 lancer regiments form 1 regiment for the mobile Division at Antwerp. The depôts are in like manner grouped under a Lieutenant-Colonel and 2 Majors.

*Artillery.*—The field artillery comprises 2 brigades of 2 regiments. Each brigade provides the artillery of an Army Corps, consisting of the divisional and the corps artillery and the ammunition columns. The divisional artillery is formed of 8 batteries of 1 regiment, and divided into 2 groups of 4 batteries (1 for the mixed Division). Each group is commanded by a Colonel or a Lieutenant-Colonel.

The corps artillery is formed of 7 field and 2 horse batteries, divided into 2 groups of field and 1 of horse artillery for 1 Division of cavalry.

There are 9 ammunition columns to each Army Corps, 4 infantry and 5 artillery. These columns are formed from 2 of the reserve batteries of each Army Corps; the remaining reserve batteries, 6 in number, are attached to the movable Division in the Antwerp position.

The infantry ammunition columns are horsed by the train.

The 5th, 6th, and 7th regiments of fortress artillery are entrusted with the defence of Antwerp, Termonde, and Diest; the 8th regiment would defend the Meuse lines.

*Engineers.*—The formations allotted to the field army are the following :—

1 engineer company with each mixed Division.
1 section field telegraph with each Army Corps.
1 engineer park to each Army Corps.
1 section field telegraph at Army Headquarters.
1 railway company „

The defence of the fortresses requires 12 engineer companies, 1 fortress pontoon company, 1 fortress telegraph company, and ½ company artificers.

*Train.*—One train battalion of three companies is attached to each Army Corps. Of these, two provide for all duties in connection with the Divisions. The 3rd company does the general duties of the Army Corps. The 7th company, which belongs administratively to the 2nd battalion, provides for Army Headquarters.

The following is a summary of the total forces that should be available :—

| | Officers. | Men. |
|---|---|---|
| Field army | 2,193 | 65,903 |
| Fortress troops | 1,605 | 59,018 |
| Territorial gendarmerie | 47 | 2,082 |
| Total of the Belgian Army on a war footing | 3,845 | 127,003 |

The difference between the strength on the peace and war footing amounts to 428 Officers, 79,437 men, and 12,914 horses. No provision appears to be made for obtaining the increased number of Officers. The horses would be obtained by registration in peace.

### *Bulgaria.*

The result of the new organization of the infantry, introduced at the beginning of 1888, has been to materially increase the force available on mobilization. At the end of 1889 the peace strength was as shown in the following table :—

| Arm. | Officers. | Men. |
|---|---|---|
| 24 infantry regiments of 2 battalions | 1,200 | 24,981 |
| 6 artillery regiments of 4 batteries of 4 guns and 4 batteries mountain artillery of 2 guns | 162 | 3,900 |
| 4 cavalry regiments of 4 squadrons and 1 bodyguard squadron | 107 | 2,874 |
| 1 regiment of pioneers of 2 battalions | 50 | 1,553 |
| 1 disciplinary company | 4 | 31 |
| 1 siege battery | 4 | 123 |
| Arsenal artillery | 14 | 624 |
| War Office and commands | 36 | 20 |
| Fleet | 7 | 306 |
| Total peace establishment | 1,584 | 34,412 |
| Total war establishment | 2,358 | 122,778 |

In addition to the regular army, there would be probably about 45,000 militia (opoltschenie) available. It is composed as follows :—

| | |
|---|---|
| The permanent cadre and the 1st Ban (of which 16,000 men remain for more than a year with the colours and the rest more than 2 months) | 22,000 |
| The 2nd Ban (age 28 to 32 years); these have 8 weeks' training | 19,000 |
| The 3rd Ban (age 32 to 40 years); without any military training | 23,000 |
| | 64,000 |

Deducting 30 per cent. for casualties and absentees will leave about 45,000. This force is not at present properly equipped or armed, and with the small amount of training it gets is not to be reckoned upon, except in second line.

*New Laws.*—Several new laws were approved by the Sobranje during the session that ended in December, 1889, the following amongst others :—

1st. Army law by which the end of the period of liability to military service was extended from the age of 40 to 45. The only ground of exemption is to be absolute physical disability. The term of service is fixed, in the active army at 2 years for the infantry, and at three years for the cavalry, artillery, and technical troops; in the reserve at 8 years for the infantry and at 5 years for the other arms; in the Landwehr at 7 years in the 1st levy, and 8 years in the 2nd levy.

2nd. A law for the maintenance of discipline, compiled from the military laws in force in the principal European armies.

3rd. A law for the completion, training, and promotion of reserve Officers.

*Armament.*—The present situation is unsatisfactory; there are only about 50,000 Berdan rifles and 80,000 Krnka and other systems. The Austrian Mannlicher magazine rifle has been adopted, however, and is being introduced.

## *China.*

The following account of the armed forces at the disposal of China is taken from an article in a number of the Russian "Invalide," published in 1889. China is divided into five territorial groups, in each of which the civil administration and military command and formations have their special types. These are: 1st, the 18 Chinese provinces proper, with the island of Hainan and Formosa; 2nd, Thibet; 3rd, Mongolia; 4th, Manchuria; and 5th, East Turkestan, Tarbagatai, and Ili.

The Chinese troops are distinguished by the time of their formation, by their organization, by the nature of their service, and by their importance in the political being of the empire. Still they may be classed in certain specified categories :—

1st. The Manchurian troops are those of the Eight Banners; 2nd, the Chinese troops of the Green Flag: 3rd, the trained Chinese troops of various nominations, the militias of Mongolia and Thibet.

The Manchurian Banner troops in actual service consist of those in Pekin and its vicinity, and of those garrisoning the provinces. The first group numbers about 163,000, or probably 118,000 fighting men, after deducting non-combatants and untrained men. Of these the "detachment of field troops," numbering 8,000 infantry, 4,000 cavalry, and 800 artillery with 189 guns, has a special military value. The troops composing it are armed with modern weapons, and more or less thoroughly trained.

There are about 15,000 of the second group of Banner troops quartered as

garrisons in the chief towns of the eleven provinces of China proper, in the three Manchurian provinces, in Ili, Tarbagatai, and Urumtschi.

The troops of the Green Flag form the bulk of the provincial troops in China proper. Their regulated establishment is 568,000 men, including navy requirements. In practice their numbers are at the discretion of the local officials, and their military value is insignificant. With a view to raising it, special field detachments were formed in each province to which a higher training was imparted, the unit being, for infantry 500, for cavalry 250.

To summarize, the grand total of the armed forces amounts to 1,200,000 men; but of these no more than 400,000 are trained or provided with modern arms.

Special attention has been paid of late to the provinces of Manchuria, where, owing to the proximity of the Russian frontier, a conflict sooner or later seems unavoidable. The garrisons amount to 37,000 Banner troops, and more than 48,000 trained troops, regularly organized and armed with Mauser rifles, Winchester carbines, and Krupp guns.

### *Denmark.*

The new fortifications at Copenhagen were advanced so far during 1889 that at the beginning of this year the following was the situation :—

Finished works.—The two permanent batteries at Thinghöi and Vangede were each provided with two machine-guns in armoured disappearing carriages, and the provisional battery on the Thinghöi plateau was prepared. With this the whole of the projected works on the north-west front were completed.

Works in progress.—The fort at Gardenhöi was provided with a Gruson tower for two long 15-cm. guns. The foundations also were commenced for a battery of four 15-cm. guns, to be mounted in Schumann armoured carriages.

The fort at Sammelmosegaard was furnished during 1889 with a case-mated building in beton, and early in the spring of this year the foundations are to be prepared for a battery of three short 15-cm. guns and two 7·5 quick-firing guns. The construction of the fort should be so far advanced in the course of the summer that only the placing of two Gruson towers will be wanting to complete it.

The Christiansholm battery was so far advanced in 1889 that it only wanted a portion of its armament. The construction of a connected enceinte from Utterlevmose to Kjöge Bay had progressed so far that it could be prepared for defence at an early date, though the ditches have not been excavated to their full depth.

### *France.*

*New Laws.*—The number of battalions of the African light infantry was increased by two—from three to five. The strength of each company was fixed at 5 Officers and 250 men. The number of companies is not fixed, but will vary with the requirements.

*Re-engagement of Non-commissioned Officers.*—The re-engagement may be for a period of 2, 3, or 5 years, up to a total service of 15 years. On the expiration of this period they may be retained in the service as "commissioned" non-commissioned officers. The number of re-engaged and "commissioned" non-commissioned officers is not to exceed two-thirds of the number in any unit, not including those on Staff employ. Every year the Minister of War decides how many re-engagements may take place. The re-engagement has effect in the unit in which the individual is serving; but in special cases he

may be permitted to go to another regiment. If he goes to a different arm it must be as a private.

The re-engaged non-commissioned officer becomes entitled to a bounty paid at the time, to a premium paid on the expiration of his service, and to an annual gratuity. Besides these payments, he receives a higher rate of pay, and an addition to this every five years. If married and living out of barracks, he receives a further payment.

The amounts paid are shown below :—

| | | | |
|---|---|---|---|
| Bounty — During the first 5 years of á re-engagement | For 2 years | 240 | francs. |
| | „ 3 „ | 360 | „ |
| | „ 5 „ | 600 | „ |
| Bounty — After a 5 years' re-engagement | „ 2 „ | 200 | „ |
| | „ 3 „ | 300 | „ |
| | „ 5 „ | 500 | „ |
| Annual gratuity | | 200 | „ |
| Premium for 2 years | | 600 | „ |
| „ 3 „ | | 900 | „ |
| „ 5 „ | | 1,000 | „ |
| Monthly increment to pay during the first 5 years | | 9 | „ |
| „ „ from 5 to 10 yrs. | | 15 | „ |
| „ „ „ 11 years on | | 21 | „ |
| Compensation to married non-commissioned officers living out of barracks | | 15 | „ |

*Creation of a Railway Regiment.*—A fifth engineer regiment is to be formed, to be called "Régiment de Sapeurs de Chemins de Fer." It is to consist of 3 battalions each of 4 companies, and 1 transport company. The following formations will be absorbed into it : the former depôt companies of the 4 engineer regiments ; the former 4 railway companies, and 4 companies (the former 20th Engineer battalion). The strength of the regiment is 63 Officers, 485 non-commissioned officers and cadres, 1,550 men, 95 horses.

*Recruiting Law of the 15th July*, 1889.—The 1st section embraces in nine articles the general provisions which contain the gist of the whole law :—

1. Every Frenchman is bound to render personal military service.

2. The obligation to serve is the same for all, and extends over a period of twenty-five years.

3. No one is to be enrolled in the French army unless he is a Frenchman born or naturalized ; the exceptions permissible are stated in the law.

4 to 6 deal with the enrolment of those who have been punished frequently for dishonourable offences previous to entry in the army, in the Algerian infantry, or in the ranks of the colonial disciplinary troops.

7. No one is to be taken into Government employ without proving that he has fulfilled his military obligations.

8. Every organized corps when under arms is subject to military law, forms an organic part of the army, and is placed under the Minister of War or of Marine.

9. Military individuals serving with the colours are to take no part in elections.

The principal points of difference between the present law and that of the 27th June, 1872, are the following :—

1. Enrolment of all those liable who are physically fit in the army ; removal of all the former exemptions from service, of the 1 year volunteer service, and the division of the contingent of recruits in two portions.

2. The grant of furloughs to men of certain specified categories, on con-

dition of their remaining at the disposition of the Minister of War, after serving 1 or 2 years in the active army.

3. Introduction of a tax for all persons not enrolled, or who serve for a less period than 3 years.

4. The extension of the total period of liability from 20 to 25 years.

5. The reduction of the term of active service from 5 years to 3, and the increase of service with the reserve to 7 years; liability to serve 1 year in the territorial army and 3 in its reserve.

6. The grant of furloughs to a certain number of men after 1 year with the colours, so as to keep the peace strength of the army within the limits fixed.

The effect of the law will be that about 200,000 recruits will be enrolled in place of 140,000. The number of men of the younger annual classes will be materially increased by this, both in the peace army and on mobilization. The total strength will also be larger.

*Services of the Line of Communications.*—The boundaries of the area to be included are to be fixed by the Minister of War at the commencement of hostilities, but may be changed during the course of operations. The services are divided into the administration of the railways and the Etappen arrangements. Where several armies are operating under one command a Director-General is placed at the head of each of these services. The General or other superior Officer in charge of railways is termed "Director of Railway Services with the Armies." An engineer and the necessary military and technical Staff are attached to him, and the Line and Field Railway Committees work under him.

The Etappen services are organized by armies, and embrace all the matters connected with the area of the line of communications not included under Railways and the working of the civil administration in the enemy's country. The Director of Etappen is directly subordinated to the Chief of the Staff of the operating army; to him are attached a special Staff, the heads of the civil branches of the Etappen service, Etappen troops, and the necessary executive personnel. Within the limits of his general instructions, the Etappen Director, who is to be acquainted in good time of the operations contemplated, makes the necessary arrangements for the maintenance and security of the communications, and the sending up of war material to the front. In matters connected with the means of transport, and the use of the railways, he has to place himself in communication with the Committees concerned, but he is not to interfere in the technical services.

The Chief of the Staff gives the Director-General the necessary information respecting the operations and requirements for the armies that may be expected to result from them. He is not restricted in his choice of means and the execution of the measures adopted; but he has to acquaint the Minister of War with the requirements in men and material. He has, further, to regulate the relations of the railway and Etappen officials to one another; to allot the lines of railway to the several armies, to indicate the Etappen zones for each of these, and to maintain constant communication with the heads of the several branches at headquarters and the commanders of the several armies. With an army operating independently, the functions of the Directors of Railways and of Etappen are combined in one General Officer.

*Constitution of the Superior Committee on Railways.*—The Chief of the General Staff acts as president, the Officer designated to be Director-General of the Railway and Etappen services in war as vice-president. The members are the Director of Railway services at the Ministry of Public Works, two Inspectors-General or Chief Engineers of Roads, the technical members of the Line Committees, and twelve military members, amongst them being the

military delegates of the Line Committees, and the senior Officer of the railway section in the General Staff.

The sphere of this Committee extends to the discussion and giving an opinion on the questions laid before them by the Minister of War concerning arrangements for strategical transport, the construction of new lines, rolling stock, the organization, training, and employment of the railway troops, contracts with the railway companies, security of the lines, as well as the means for destroying and repairing them.

*Organization of Railways for Military Purposes.*—The disposal of all matters connected with the use of railways is arranged in the Railway Section (No. 4 Office) of the Great General Staff. The execution and control of the service is entrusted, in each of the six great railway companies, to a Line Committee, consisting of a representative of the company as technical member, and a superior Officer as military member.

In peace the Line Committees have the following functions to perform :— The working out of the capability for military transport of the line concerned, the preparatory work for strategical transport, the supervision of the rolling stock, the way and the constructions as regards their condition, the conduct of experiments calculated to improve the lines for military purposes.

In war, from the first day of mobilization, the Line Committees take charge of the entire transport service on the several lines. Line Sub-Committees and Station Committees, composed of one Officer and the superior station official, are attached to them.

A sufficient number of military and technical Staff are attached to the Line Committees.

A General or other superior Officer, with an Engineer attached, at the headquarters of each group of armies, or of an army operating alone, conducts the entire railway service. The Line Committees for the working on the national companies' lines, and the Field Railway Committees, are placed under the General, whereas the Engineer controls the railway troops and the telegraph inspections.

The Commander-in-Chief must make any alterations in the organization of the above-named officials that appear to him to be necessary during the course of operations ; but the greatest value is always to be attributed to the close working together of the technical and military elements in the Committees.

*Organization of the Railway Working Sections.*—These belong to the military corps already organized in peace ; in war they undertake, in concert with the railway regiment, the construction, repair, and working of the lines which do not belong to the system of the national railway companies. The personnel consists of engineers, officials, and workmen of the six great companies and of the State lines, who enter voluntarily, or under the recruiting law. The commanders have the authority of independent commanding Officers, and are placed under the Field Railway Committees.

*Military Telegraphs.*—A completely new organization was introduced in 1889, both of the Telegraph Sections of the General Staff and of the telegraph service with the troops. A light telegraph service was introduced for use with cavalry.

*The Telegraph Section of the General Staff* deals with everything connected with military telegraphy, ballooning, and pigeon posts. All the Ministerial Orders connected with the telegraph services go to the Director of the Section, who superintends their execution, and issues any necessary instructions.

*The Light Field Telegraph for Cavalry.*—To facilitate the transmission of orders and intelligence, as well as to connect the headquarters, the utmost use is to be made of electric and optical telegraphs and of telephones in connection with existing or newly-laid lines.

In every regiment of cavalry there are in peace six telegraphists (1 non-

commissioned officer, 1 corporal, 4 men), who are divided between two stations, each forming in itself a complete unit. The men are equipped with the necessary material and tools, and they carry a badge as a special mark.

The material for this service is divided into what is required for the stations: that for the brigades and the reserve with the Divisions. An unpublished instruction describes the material and arrangements for loading the vehicles, of which there is one per brigade and division.

In war a mounted telegraph official is attached to each Division or independent brigade, under whom are placed the united regimental telegraphists. One or two stations are sent with advanced detachments on reconnoitring or outpost duty; the necessary material and tools are carried on horses. The rest of the telegraphists remain back with the main body of the Division or brigade during marches; but one station must generally be at the head of the column ready to establish communication in any direction. The wagons move in front of the ambulance, where the telegraphists will remain when there is fighting going on.

*Organization of the Etappen Service.*—The service is organized by armies. The Etappen Director of an army has the rank of a Sub-Chief of the Staff. Within the general directions received from the Chief of the Staff he is completely independent respecting the services under him. He has on his Staff the heads of the following branches employed on the Etappen: artillery, engineers, intendance, medical, gendarmerie, post and telegraph. As a rule, the Etappen Director is at the Army headquarters, and enters on his functions, together with the officials under him, on the commencement of the strategical concentration. He is responsible for the quiet and security of the area allotted to him.

The Directors of the great artillery park and the engineer park will be the heads of their respective services. At the beginning of the operations, the artillery park will be formed in five echelons placed along the line of railway leading to the army; the first echelon with the transport division must be always near the chief Etappen station and the army, so as to be able to complete the ammunition and the material in the shortest possible time. Similar dispositions are to be made with the engineer park. The head of the Intendance is responsible for all the administrative services connected with the formation and storing of depôts, the carrying out of requisitions, the working of the field bakery columns and cattle depôts.

The Director of the Sanitary Services is responsible for all the medical establishments within the Etappen sphere. They are divided into two groups, one connected with the shelter and treatment of the sick and wounded; the other with their evacuation to the rear. To the former belong the field hospitals, the auxiliary hospitals, and the establishments in towns and villages; to the latter the evacuation hospitals at the principal Etappen stations, the sick rooms at the railway stations, and the sick trains.

The Etappen Commandants conduct the whole services at the more important stations; they are responsible for the order and security of their district, and regulate the shelter and rationing of troops and transport passing through.

*Establishments*, 1890.—The Budget was framed on an average strength present of 25,896 Officers, 503,649 men, and 138,301 horses, exclusive of the gendarmerie. There is an increase of 201 Officers, 13,719 men, and 2,324 horses over the number for 1889, without counting the additions caused by the 19 new batteries, the railway regiment, and the increased number of artillery Officers.

*Promotion of Officers.*—The regulations regarding the promotions of Officers were again altered, by instructions from the Minister of War, for the fourth time within four years. The preparation of promotion lists up to the rank

of Commandant (Battalion Commander, &c.), inclusive, is undertaken by the *Commissions d'Armes*. In the infantry these are composed of the Generals commanding bodies of infantry within the Army Corps area; the General commanding the Army Corps presides. In the other arms the whole of the Inspectors-General belong to the Commissions, one of them being nominated President.

Each year the Minister of War determines the numbers and limits of age of the Officers to be included in the lists for every arm and branch of the Service.

In the proposal for promotion by selection, this limit is diminished by six months in the case of Officers to Battalion Commander, inclusive.

The *Commissions d'Armes* prepare further lists of Officers proposed for promotion to Lieutenant-Colonel, Colonel, and Major-General for submission to the *Commission Supérieure de Classement*, which is composed of all the Generals Commanding. These draw up from them the promotion lists of superior Officers up to Major-General, and submit a proposed list for promotion to Lieutenant-General to the *Conseil Supérieur de Guerre*. The latter has to consider the merits of those Lieutenant-Generals who are put forward by the Minister for promotion to General Commanding.

The same arrangements are made regarding promotion lists and lists of proposals with the Medical Officers and the Intendance and other military officials holding Officer's rank.

The whole of the promotion lists are forwarded to the Minister of War, and published in the Official Gazette.

*Alterations in the Formations of the Active Army.*—The infantry received an increase of 28 companies owing to the number in 14 rifle battalions having been changed from 4 to 6 companies. The artillery was increased by 35 batteries, which brought up the total number of field and mountain batteries to 480. The 5th and 6th battalions of African light infantry and the 5th Engineer (Railway) regiment were formed with the help of previously existing formations.

The division of the existing 6th Army Corps, stationed on the north-east frontier, into two Army Corps is contemplated, and the Council of War has decided that the second corps should be made up by new formations. During the manœuvres of the 6th Army Corps, experiments are stated to have been made regarding the most appropriate formations in an Army Corps at war strength. The formation of brigades of three regiments was said to be the most convenient, the third regiment, being a reserve regiment, to be formed on mobilization. Such an increase in the strength of the infantry of an Army Corps would require a proportionate increase in artillery.

*Territorial Army.*—The number of Officers of infantry who are borne in excess of corps establishments, and are available for new formations, has increased considerably. On the 1st January, 1890, there were 23 Lieutenant-Colonels, 208 Battalion Commanders, 870 Captains (against 140 in the previous year), and 1,584 subaltern Officers (against 395).

The Officers at disposal are in principle called up once every two years: if belonging to the Reserve, for 28 days' training, if to the Territorial Army, for 15 days.

In the Estimates for 1890 credit is taken for the training of 194,741 men of the Territorial Army. By the terms of the new organic law every man during his six years of service has to undergo a training of fourteen days' duration. Men belonging to the Reserve of the Territorial Army are not called up in peace time.

Under the terms of the above quoted law, five annual classes of the Territorial Army which had been dismissed become subject to service again; the number of men in these is about 600,000.

*Italy.*

The strength of the armed forces available was the following :—

| | | |
|---|---|---|
| Permanent army with the colours | 242,508 | men. |
| On furlough | 583,610 | „ |
| Total | 826,118 | „ |
| Mobile militia | 389,479 | „ |

(Exclusive of the territorial militia.)

*Formations in Africa.*—Italy has extended her occupation of Massowa to Keren and Asmara, and changes have occurred in the strength and organization both of the European and the native troops employed.

The constitution of the special European corps was fixed as follows :—

| | Officers. | Men. | Horses. |
|---|---|---|---|
| 1 regiment of rifles of 4 battalions of 4 companies | 96 | 2,356 | 37 |
| 1 bersaglieri battalion of 4 companies | 23 | 536 | 8 |
| 2 mountain batteries of 4 guns | 8 | 250 | 16 |
| 2 companies of fortress artillery | 16 | 450 | 16 |
| 1 company artillery artificers | 3 | 100 | 3 |
| 2 sapper companies | 10 | 360 | 10 |
| 1 company engineer specialists | 7 | 250 | 7 |
| 1 sanitary company | 5 | 120 | 5 |
| 1 supply company | 5 | 250 | — |
| 1 train company | 5 | 150 | 10 |
| Total | 178 | 4,822 | 112 |

The native irregulars are composed as follows :—

| | Officers. | Men. |
|---|---|---|
| 1 infantry regiment of 4 battalions of 4 companies | 95 | 3,265 |
| 1 reconnoitring squadron | 6 | 160 |
| 1 mountain battery | 5 | 169 |
| 2 Buluk zaptié | 2 | 52 |
| Further native formations | 8 | 200 |
| Total | 116 | 3,846 |

Of the Officers, 74 are Italians and 42 natives; of the men, 233 Italians the rest natives.

There is a central depôt at Naples.

*Montenegro.*

For the defence of their own mountains, the Montenegrin forces are well adapted and sufficient. A wider sphere of action for them has been opened up in prospect, in connection with the future solution of the Balkan Peninsula question. Though unquestionably unfitted by their constitution and training to enter on regular offensive operations, the Montenegrin Army might do good service in the mountainous country of the neighbouring States, where large concentrations are not practicable.

In peace, 3 battalions for garrison duty at Cettinje, Podgoritza, and Nikschitsch, and some men specially called up for frontier work, are the whole force on a permanent footing, about 2,000 men in all.

In war, the infantry is divided into 6 brigades containing 42 battalions. The armament available is 25,000 Austrian Werndl rifles (pattern 1873), and about 20,000 on other systems (Krnka, Henry-Martini, &c.). Ammunition is available. The permanent troops alone possess a more or less regular training. The whole of the remaining population fitted to carry arms are, from the European point of view, entirely untrained. They undergo no drills, and can be called up only in the event of war.

The artillery consists of one brigade, composed of 6 mountain batteries of 4 guns, which are attached in war to the 6 infantry brigades, and 3 batteries of 8 guns (9-cm.) as reserve artillery. Altogether 48 Krupp guns and others of an older pattern.

The entire strength available for war is stated as 60,000 men, of whom 2,000 are regular troops; 30,000 the first levy, 10,000 the second, and 18,000 the third. In the event of a serious defensive war, this number could probably be rapidly assembled; but it is the maximum available. For offensive operations beyond the frontier, not more than from 8,000 to 10,000 would be available.

*Holland.*

A Commission appointed to report on the military requirements reported that the powerful defence of the State, if attacked, is the main consideration in the military organization. Against a strong enemy, however, only the part west of the New Holland water line is to be seriously defended. One portion of the force available must form in advance to meet the enemy, and endeavour to throw him back. If unsuccessful, it must delay the enemy's march into the country, and, if possible, prevent it. For this purpose a Field Army is necessary, which would also take part in the defence of the lines and the coast, and later, if circumstances permitted, resume the offensive. A Field Army is also necessary for maintaining neutrality, and when expedient carrying the war beyond the frontiers.

Under the protection of the Field Army, another portion of the forces —the garrison troops—must place the several defensive lines in a state of defence. The training of these troops must be of a different nature to that of those composing the Field Army; but their military worth must not be inferior. The garrison troops are supported by the troops watching and defending the ground between the works. These form also the First Reserve of the Field Army.

Depôt troops are also required to fill the gaps caused by losses, a Landwehr to support the regular Army, and a Reserve to the Landwehr, from which new formations may be raised.

The numbers recommended by the Commission were—

| | |
|---|---|
| For the garrison troops | 31,000 |
| For the covering and reserve troops | 20,000 |
| For the Field Army | 40,000 |

The minimum strength of the Army, therefore, should be 110,000 men, and of the Landwehr 50,000 men.

*Austria.*

The following are the more important changes in organization :—

In the artillery 14 new heavy batteries were formed. Hitherto the 14 corps artillery regiments, each of 3 heavy and 2 light batteries, formed in war the corps artillery of 40 guns. Each Army Corps had consequently, reckoning the 3 heavy batteries per infantry Division, 11 batteries, that is, 88 guns. In order to bring this number up to 96 guns per Army Corps, a sixth heavy battery has been added to the corps artillery. The increase in men required for these formations can only be completed in 1892. Until then the batteries will have to remain on the weaker peace strength.

A third battalion has been added to the railway and telegraph regiment.

*Austrian Landwehr.*—The organization has received a material increase of power by the definite introduction of the regimental system, and by the doubling of the instructional cadres. Formerly the commanders of the Landwehr regiments were "nominated," but remained with the regiments they were serving in. In the case of the 22 newly formed Landwehr regiments this has not been done, but each regiment has its own actual commander, who is responsible for its training. In peace, a Colonel or a Major-General acts as Brigadier of Landwehr, and has to supervise the Landwehr organizations throughout a territory of the size of an Army Corps district, which, considering the small Staff at his disposal, may have its difficulties.

In future, also, the Landwehr battalions are to be named after the chief place in the battalion district, and will be numbered throughout from 1 to 82. Those from 1 to 78 are organized in regiments of from 3 to 5 battalions. For example, the 1st regiment is formed as follows :—

Niederösterreichisches Landwehr Infanterie Regiment, No. 1, Stab. Wien—

Landwehr Battalion, Wien, No. 1.
" " Kornenburg, No. 2.
" " Wiener Neustadt, No. 3.
" " Krems, No. 5.

Outside the regimental grouping are the Dalmatian battalions, Zara, No. 70 ; Spalato, No. 80 ; Ragusa, No. 81 ; Cattaro, No. 82 ; also the 10 Tyrolese rifle battalions.

In peace the battalion commander commands the cadres, and on mobilization he commands the field battalion formed.

Each battalion cadre is divided in peace into two "instructional cadres," each having the following establishment :—1 Captain or Senior Lieutenant as commander, 2 subaltern Officers for instruction, 1 cadet Officer aspirant or sergeant, 1 pay non-commissioned officer, 1 subdivision leader, 2 or 3 corporals, 2 lance-corporals, 32 Landwehr privates, and 1 musician. Each instructional cadre is, as a rule, divided into two subdivisions.

The recruits of the Landwehr battalions are, in peace, eight weeks with the battalion cadres ; ordinarily, at the commencement of their Landwehr service.

*Hungarian Landwehr.*—Both the infantry and cavalry have undergone considerable organic changes, and as a result of these their strength has been increased.

As regards the Honvéd infantry—

1st. The cadres of 4 battalions are to be formed in the 1st and 5th Landwehr half brigades the same as in the rest of the field battalions of the Landwehr.

2nd. In every battalion in place of the former 1 cadre company, 4 companies.

3rd. In every Landwehr half brigade 1 Ersatz battalion cadre and 11 new Reserve cadres are to be formed.

4th. The peace establishment is to be uniform in all the half brigades.

5th. In every half brigade a Landwehr recruiting detachment is to be established.

On mobilization, the following development takes place :—

1st. An Ersatz battalion is to be formed from each of the Ersatz cadres.

2nd. The Reserve cadres are expanded into Reserve formations.

The peace strength of a half brigade consisting of 3 battalions is 36 Officers and 348 men ; of one consisting of 4 battalions, 47 Officers and 462 men. Of an Ersatz battalion cadre it is 4 Officers and 14 to 16 men, and of a Reserve cadre, 1 Officer and 7 to 12 men. The war strength is generally that of an infantry battalion or of a regiment of the active Army.

In the Honvéd cavalry the following changes have been made :—

1st. In place of the previously existing Reserve Landwehr hussar regiments or divisions, two new squadrons (5th and 6th) have been added to each hussar regiment.

2nd. An Ersatz troop has been formed in each regiment.

3rd. The peace strength has been made uniform.

4th. The yearly contingent of recruits per regiment has been fixed at 204 men.

The war strength of a Honvéd hussar squadron is generally that of a squadron of the active Army. But there is this difference in their respective value, that, whereas the regiments of the active Army have in peace 6 squadrons at war strength, the Honvéd squadrons have only one-fourth of their war strength in peace. But, besides this, the new 5th and 6th squadrons are not intended to take the field with their regiments, but are to act as Divisional cavalry with the five Honvéd Divisions. Thus four squadrons only are available per regiment with which to form cavalry brigades and Divisions.

*Portugal.*

By the recruiting law of the 12th September, 1887, obligatory and personal service was introduced, which has had the effect of increasing the forces at disposal. Its general influence has also been good, notwithstanding the numerous exemptions from service that are permitted.

Liability to military service commences on the completion of the twentieth year ; but youths can enter as early as sixteen years of age, provided they are up to the standard of the physical requirements. The period of service is 12 years, of which 3 with the colours, 5 years in the 1st Reserve, and 4 years in the 2nd Reserve.

When the new law has exercised its full effect, the following armed forces should be available :—

Army in 1st line—
Trained men, 100,000 (8 classes of 13,000 men, active Army and 1st Reserve).
Army in 2nd line—
Trained men, 50,000 (4 classes of 13,000 men, 2nd Reserve).
Untrained men, 120,000 (12 classes of 10,912 men, not enrolled).

Total available, 150,000 trained men, 120,000 untrained men, being 50,000 more trained men and 78,000 more untrained men than under the old system.

The whole territory of the kingdom including the Azores and Madeira is

divided into thirty-six infantry recruiting districts, answering to the number of infantry and rifle regiments. Each recruiting district is further divided into reserve districts, each of which is allotted to a reserve battalion. The other arms are divided for recruiting purposes amongst the infantry recruiting districts.

The men of the 1st and 2nd Reserves of all arms belong to the reserve district in which they reside. A superior Officer on the active list, who is at the same time commander of the reserve battalion, exercises the functions of Reserve District Commander. The permanent cadre of the reserve battalion, consisting of 1 Officer, 3 non-commissioned officers, and a few men, has to train the men of the 2nd Reserve who have not served. To assist in this, a number of active Officers and non-commissioned officers are temporarily attached.

The Officers for the reserve are drawn from a great variety of sources; to qualify them for promotion to a higher grade up to the rank of Captain inclusive, four months' service with an active regiment is required.

A Commission has been sitting to consider and report on the best measures to take for improving the defences and communications. It resolved itself into two sections, one to confine its attention to defence, the other to communication. Its recommendations for the defence of Lisbon have been accepted. The plan is to supplement the old works of the entrenched camp on the right bank of the Tagus with newer works on the left bank. To complete these works by the construction of a second defensible circular road (such as already exists between the works on the right bank) from Moita by Paimella to Setubal. These works, in concert with the armoured towers on Bugio Island, and a barrier of stationary torpedoes, should render an enemy's entrance into the Tagus almost impossible.

Besides this, two lines of works are projected over Torres Vedras, and between this village and the enceinte of Lisbon.

### *Roumania.*

*Reorganization of the Territorial Troops.*—The system in the past, both with the infantry (dorobanzen) and the cavalry (calarasch), has been for the men to come up and do regular military duty from time to time, being trained in the same way as the men of the active Army. But the sum of money that could be allotted in the budget for this purpose was so small that the periods had to be curtailed to such a degree that a proper military instruction could not be given.

To remedy this a new organization has been introduced. In every battalion of the thirty-three dorobanzen regiments one permanent company has been created, which undertakes the instruction of the cadres and the training of the recruits. The necessary addition was made to the Officers.

In 4 of the calarasch regiments, 2 permanent squadrons were formed; in the remaining 6 regiments, 1 permanent squadron and 3 territorial squadrons.

Although the strength of these permanent formations is not great, still they can do a good deal in training successive parties that remain up for two months. The organization allows also of forming a third battalion per regiment in case of necessity, and it will be of inestimable value in connection with the preparatory measures for mobilization.

*Works of Defence.*—The fortified works are divided into two separate groups: 1st, the fortifications of Bucharest, which are the central point of the Roumanian system of defence. The town is surrounded by a large entrenched camp, adapted so as to act as a supporting point in case of necessity to an army of 150,000 to 200,000 men. There are 18 detached forts, two—Otopenic to the north, and Afumatic to the north-east, of Bucharest—of large dimensions, the remainder being of medium size.

Situated at a distance of from 12 to 13 kilometres from the centre, these 18 forts form a circle of 72 kilometres circumference. The intervals between the forts are about 4 kilometres, and each is provided with a fortified battery. Communication between the several forts is provided for by a special circular railway for military purposes exclusively; it is in connection with all the lines entering Bucharest. The whole of the works should be completed within three or four years.

The armament is to consist of 12-cm. guns in armoured turning towers, of which there will be from 36 to 40, and quick-firing guns in Schuman armoured towers.

The second group of fortified works is the line Galatz—Namoloasa—Focsani. It is designed to close the way to an enemy endeavouring to force his way up the Danube from the Black Sea, or southwards through the river valleys of the Moldau.

Situated at no great distance from the point at which the Pruth empties itself into the Danube, and separated from the Pruth, which forms the frontier towards Russia, only by Lake Bratesch and its marshy surroundings, Galatz forms both a frontier town and a port. In its latter capacity it forms a key to the Upper Danube of such enormous importance that its protection must necessarily find a place in every scheme of defence.

The plateau rising to the west and north-west of the town facilitates the fortification of the Galatz position, and Schuman combined batteries will be employed there. For the protection of the south line three bomb-proof works are to be constructed at Galatz, Focsani, and Namoloasa. The number of guns of different calibres will be about 400, both heavy and quick-firing guns being employed.

In short, the line of approach between the Danube and the Carpathian Mountains will be so completely closed that only at two points is there an open space of 10 kilometres left, just sufficient to give battle to an enemy's column with advantage. The speciality of the works lies in the absence of ditches, and in the employment of the fire of quick-firing guns instead of small-arm fire for repulsing the attacking columns.

The general plan of the defensive works provides further for the construction towards Russian territory of fortifications at Koutanli, on the Black Sea, of a bridge-head at Czernavoda, on the Danube; and towards Austria of a post at Kampina, at the point where the Prahowa valley opens out into the Plojeschti plain, and of a bridge-head on the Octel.

*Communications.*—The railway system continues to be extended, and at the end of 1889 the State lines were working over 2,230 kilometres, and 222 kilometres were in course of construction.

At the close of the manœuvres in Moldavia more than 30,000 men, with horses and war material, were carried on one day to different points. Apart from minor difficulties, both the plant and the personnel stood the test well.

The most important event in connection with the communications during the year was the construction of a railway bridge over the Danube at Feteschti. It was only by such a measure that the Dobrudscha could be relieved from its former isolation, and brought into closer contact with Old Roumania. All the progress made by the Roumanian Army during the last few years has had for its object the permanent possession of the Dobrudscha. To secure this strategically, a railway and bridge communication are of great value.

*Composition of the Standing Army.*—The peace strength of the Army is fixed for 1889-90 at 108,684 men, and its composition is the following:—

*Infantry.*—8 regiments of 2 battalions of 4 companies and 1 company non-combatants.

*Rifles.*—4 battalions of 4 companies and 1 company non-combatants.
*Cavalry.*—3 Rosiori regiments of 4 field squadrons and 1 subdivision of non-combatants; 8 permanent squadrons.
*Artillery.*—8 regiments of field artillery.
57 batteries (49 field, 8 horse).
4 batteries of mountain artillery.
1 battalion of fortress artillery of 4 companies.
3 companies of arsenal artillery.

Each field artillery regiment has a subdivision of non-combatants.

*Technical Troops.*—2 regiments of engineers of 3 battalions of 4 companies, and 1 of non-combatants. The 1st regiment consists of 1 battalion of railway troops and 2 battalions of sappers; the 2nd regiment is composed of 1 battalion of pontoon troops and 2 battalions of sappers. There is a telegraph company with each sapper battalion.

*Train.*—4 squadrons.

A proposal has been put forward to form a 5th Army Corps exclusively for garrison duty in the fortified positions, thus setting free the existing four Army Corps for operations in the field.

*Russia.*

*Train Cadre Battalions.*—Nos. 1, 2, 4, and 5 battalions have 4 companies, No. 3 has 2 companies. The companies are numbered throughout from 1 to 18 and divided into 5 subdivisions. The battalions are placed under the local brigades and administered by the Staff. Each has a depôt of wagons and stores ready for mobilization; the wagons would then be horsed by requisition. The Officers are borne as infantry Officers.

In war these cadres are to be expanded into 18 train battalions, numbered throughout, each forming 5 war transports = 90. These are allotted to the armies. The peace battalion commanders become heads of army transport; the peace company commanders are placed in command of the war battalions.

The war transports, which are composed either of wagons or pack animals, are divided into 2 subdivisions of 4 sections. The wagons have 2, 3, or 4 horses.

The peace establishment of a train battalion of 4 companies is 12 Officers, 378 other ranks, 80 horses, 40 wagons.

The war establishment of a train battalion of 5 two-horsed wagon transports and staff is 16 Officers, 1,100 men, 2,041 horses, 918 wagons.

A pack transport consists of 3 Officers, 197 men, 362 horses.

It requires 172 two-horsed, 124 three-horsed, or 108 four-horsed wagons to carry four days' biscuit and groats for 10,000 men, eight days' salt, ten days' tea and sugar, besides three days' oats for 1,600 horses. A pack transport carries a similar proportion of supplies for 4,000 men and 600 horses.

*Transport attached to the Troops.*—The reorganization of the divisional and regimental transport undertaken in 1885 had for its object to introduce a lighter class of vehicle, so as to obtain greater mobility over roads generally bad, and with requisitioned horses for the most part in indifferent condition. The change was a complete one, and necessarily required time for its application throughout the Army; there are still many troops in possession, provisionally, of the old heavy pattern wagons.

*Reserve Troops.*—These are employed in war partly for the immediate strengthening of the Field Army, and partly for garrisoning fortresses and Etappen posts. In 1889 a part of the infantry reserves was set apart for the defence of the fortresses, and specially formed as fortress infantry.

Separate reserve formations only exist in peace for the infantry and artillery. In war the reserve regiments of the 1st category and the batteries are formed into infantry Divisions, differing only from those of the active Army in having a weaker artillery (4 instead of 6 batteries), and two movable artillery parks for the supply of ammunition in place of a flying artillery park brigade. The rest of the reserve troops are in part also formed into Divisions (2nd category), and part in smaller formations. In the same way as in peace, these fall behind the 1st category in readiness for war, so in war they are furnished with a less complete train.

*Reserve Infantry.*—Consists in peace of reserve infantry (cadre) regiments and battalions that are placed under the local brigades. With the formation of regiments in 1889, a beginning was made which will no doubt be carried further.

In European Russia, there are 2 regiments of 2 battalions and 80 separate battalions, each of 5 companies. On mobilization, 5 battalions of 4 companies are to be formed from each regiment or independent battalion. Infantry regiments would then be formed from these, each of 4 battalions, in all 82 regiments, of which 80 would be incorporated in 20 infantry Divisions. The far larger portion of these Divisions would consist of regiments of the 1st category, and be employed immediately in reinforcing the Field Armies; the rest would not have sufficient training to be utilized at once in the first line.

The 82 5th battalions provide for the services in the interior, and form garrisons; they remain at first in independent battalions. If it is intended to relieve them by troops of the Reichswehr, then they would be organized in larger bodies.

The strength in peace and war is the following :—

| | Peace. | War. |
|---|---|---|
| Battalion ..... | 36 Officers 493 men. | 16 Officers 958 men. |
| Regiment..... .... | 37 „ 1,504 „ | 63 „ 3,832 „ |

In the Caucasus, there are 6 regiments and 12 battalions in peace, which expand into 94 battalions on mobilization. Of these, 16 regiments of the 1st category are available to form 4 infantry Divisions. There remain 4 regiments of the 2nd category of 4 battalions for operations on a more restricted scale, and 4 independent battalions; 2 regiments of 5 battalions are without train, and can, therefore, be used only as garrison troops.

Next year, when the changes introduced in 1889 have been completed, 104 battalions will be formed on mobilization, in place of the 51 provided for previously. In Asiatic Russia there are 7 Reserve battalions, each of 5 companies. In war, 2 of them, Tobolsk and Tomsk, each form 2, and Omsk 3, independent battalions. That of Krassnojarsk forms 1 regiment of 2 battalions and 1 independent battalion; the rest, viz., Semipalatinsk, Irkutsk, and Stratensk, form each 5 independent battalions.

*Reserve Artillery.*—In peace, there are 5 Reserve brigades of 6 batteries, with from 2 to 4 guns horsed. In war, the 4 first batteries (1 heavy, 3 light) in each brigade form 4 artillery brigades, each of 1 heavy and 3 light batteries, so that 30 Reserve brigades of 4 batteries are created and employed with the Reserve infantry Divisions. The remaining 2 batteries in every Reserve brigade form each 4 Ersatz batteries.

*Reserve Engineer Companies.*—From the 5th companies of the 17 sapper battalions which exist in peace, 34 Reserve companies are formed on mobilization. Of these, 16 (11 in Europe, 5 in the Caucasus) are furnished with complete train, and employed on the communications and for siege operations. The remaining 18 companies, which are only equipped with portable entrenching

tools, form part of the garrisons of fortresses. Their war strength is 4 Officers, 237 men. 3 Reserve railway battalions are formed from 3 of the 4 battalions composing the railway brigade; strength, 25 Officers, 1,045 men.

*Garrison Troops.*—A portion of the Reserve formations are included amongst these, besides the so-called fortress troops.

*Infantry.*—In peace, there are—

1 fortress regiment of 2 battalions,
23 fortress battalions of 5 companies,

and they are named after the fortress to which they belong. The regiment and 20 battalions were newly formed in 1889 by the conversion of an equal number of Reserve battalions, of which 2 in the Caucasus.

In war, 24 fortress regiments would be formed, each of 5 battalions, from the cadres existing in peace. Besides these formations, there are the Finnish Landwehr battalions, the local detachments which are mainly maintained for the maintenance of order, and the gendarmerie.

*Artillery.*—Both in peace and war there are 50 fortress artillery battalions and 7 separate companies, named after the fortresses to which they belong. Of these, 6 battalions are in the Caucasus. Each battalion has 4 companies, excepting 2 that have 5, and 2, 6. Of the 7 separate companies, 2 are in Turkestan and 1 at Vladivostock.

| | | | | |
|---|---|---|---|---|
| In peace, the strength is | 13 | Officers, | 448 | men per battalion. |
| In war | 21 | „ | 1,308 | „ |

The independent companies vary from 220 to 450 of all ranks.

There are, besides, 5 sortie batteries, each composed of 11 Officers, 112 men, 36 horses, and 2 horsed guns, which in war are expanded into 16 batteries, each of 6 Officers, 122 men, 73 horses, and 8 guns. These are stationed at Warsaw, Novogeorgievsk, Brest-Litovsk, Ivangorod, and Kovno.

## *Servia.*

Immediately after the conclusion of the war with Bulgaria, the question of the reorganization of the Army was taken up. On the 31st January an order was issued to give effect to the decisions come to. The country was divided into 5 territorial districts, to each of which was allotted a Division of infantry. These were again each subdivided into 3 regimental districts.

In peace, the infantry consists of 5 regiments of 3 battalions (1 to each regimental district). There is 1 brigade of cavalry of 3 regiments of 3 squadrons. The artillery is composed of 5 field artillery regiments of 6 batteries of 4 guns, 1 horse battery of 6 guns, 1 mountain regiment of 5 batteries of 4 guns, 1 fortress battalion of 4 companies, and 1 park company with the siege train.

There is also a pioneer battalion of 5 companies, and 1 engineer battalion, consisting of 1 railway, 1 mining, and 1 telegraph company.

On mobilization, each of the 5 Divisional districts forms from troops of the 1st levy—

3 infantry regiments of four battalions,
1 guard battalion,
2 squadrons of cavalry,
1 field artillery regiment of 8 batteries of 6 guns,
1 pioneer company.

besides auxiliary services for the Division.

The 5 Divisional districts together furnish also the following troops outside of the Division organization :—

1 cavalry brigade of 3 regiments of 4 squadrons.
1 horse artillery battery.
2 squadrons bodyguard.
1 mountain artillery regiment of 9 batteries of 4 guns.
1 fortress artillery battalion of 4 fortress and 1 park companies.
1 siege train park.
1 reserve pioneer battalion.
1 railway regiment.
And various auxiliary services.

From troops of the 2nd levy each divisional region furnishes :—

3 infantry regiments of 4 battalions.
2 squadrons of cavalry.
1 artillery regiment of 4 batteries of 6 guns.
2 pioneer companies.
1 fortress artillery company.
And auxiliary services.

From the 3rd levy are formed in each region :—

3 infantry regiments of 4 battalions.
1 squadron of cavalry.
1 company of artillery.

The total strengths are—

| | | | | | | |
|---|---|---|---|---|---|---|
| 1st levy ..... | 65 | battalions, | 24 | squadrons, | 282 | guns. |
| 2nd levy ..... | 60 | „ | 10 | „ | 120 | „ |
| 3rd levy ..... | 60 | „ | 5 | „ | — | |
| Total..... | 185 | „ | 39 | „ | 402 | „ |

*National Militia.*—In November, 1889, a Bill was introduced into the Skupschina for the reorganization of the Army, the main feature of the scheme being the re-establishment of a national Militia. The existing plan of maintaining the regular Army by means of cadres and Reserve is to be continued. Every man is liable to military service between 21 and 50 years of age, of which period he serves 9 years in the regular Army and its Reserve. The rest of the time he belongs to the Militia, which is divided into two levies. To the 1st levy belong the Officers and non-commissioned officers of the cadres, the men who have completed their time in the Reserve, and those who have not satisfied the requirements of service in the standing cadre.

*Spain.*

Between 1886 and 1889, the effective strength of the Army was reduced by about 8,000 men. By a Ministerial decree in December last, materially reducing the peace establishments of the various units, a further reduction of 22,000 men was ordered. When this has been given effect to in its entirety, the active Army, including the garrisons of Cuba (nearly 20,000 men), Puerto-Rico (3,000), and the Philippine Islands (8,700), the Canaries (600), and Africa (Ceuta, 600, Melilla, 660), would amount only to 70,111 men, as compared with 131,295 in 1886. The reduction has entailed the whole of the field and mountain artillery being placed on a 4 guns establishment, instead of 6, as heretofore.

*Defensive Works.*—The unsatisfactory state of the Spanish finances that has dictated the wholesale reduction of establishments, has equally prevented any serious progress with the ambitious scheme adopted for the defence of the northern frontier. This scheme comprised the defence of the Ebro, with Tortosa, Saragossa, Miranda, and Santona as great places of arms, while a second line, with the entrenched camps of Gerona, Lerida, Jaca, Pamplona, and San Sebastian, would give support to a line of barrier forts pushed forward into the Pyrenees.

The extent of the line projected is about 500 kilometres, and the garrisons required would not be less than from 250,000 to 300,000 men. A very small portion indeed of the works is actually constructed, viz., Fort San Marcos at San Sebastian, and the little fort on the Choritoquieta placed in support of it.

Works are begun at Jaca, where an entrenched camp with a number of forts is designed. The greatest progress has been made with the barrier fort on the Col de Ladrones, which, in concert with the opposite-lying battery of Sagueta, blocks the Pau road ; also with the fort of St. Helena, for the protection of the Jaca—Sallent—Eaux-Chaudes road, and the strong fort south of El Rapitan, 3 kilometres north of Canfranc. These works are casemated, covered with beton, and partly armoured ; they will be completed in 2 or 3 years. The position of Jaca is particularly important as the meeting point of several roads and covering the future Central Pyrenees Railway.

At Pamplona, the works on the great fort Monte San Cristobal are so far advanced that it also may be ready in 2 or 3 years. The rest of the works there have not been undertaken. The importance of Pamplona as the junction of three roads leading into France is enhanced by its being connected directly with Madrid by rail, which would facilitate the concentration of troops in the north-west.

At Sebastian, whereas the forts of San Marcos and Choritoquieta are completed, the largest fort of Nuestra Señora de Guadalupe will not be ready for several years.

### *Infantry Tactics.*

The year 1889 was of special importance as regards the development of infantry tactics. On the one hand, the introduction of smokeless powder in combination with that of a small-bore rifle, and, on the other, the revising of the infantry drill in almost all European Armies, after the example of Germany, mark it as a year to be remembered.

So soon as the French infantry began to introduce smokeless powder and adopted the small bore, it became necessary for the infantry of other Powers to follow in its steps. In the absence of war experience, it is not possible to decide what influence its introduction will have on tactics. The numerous and thorough considerations of the questions by the light of last year's manœuvres, and the experience gained on the practice ground, though of great value theoretically, do not allow of a definite judgment being arrived at.

But this experience warrants the conclusion that, if fresh elements have not been introduced into tactics, still the use of the new explosive will have altered in many particulars the importance of existing tactics.

The most evident advantage of the new powder lies in the small amount of smoke created, which allows of better aim and, consequently, better shooting. The absence of smoke undoubtedly allows of the better employment of the quick-firing arm. A further advantage is in the better leading of the firing troops, the clearer observation of the individual, and of the effect of fire. Unless required for other reasons, the absence of smoke also allows of the pauses, formerly considered indispensable during the period of rapid fire, being omitted. On the enemy's side it prevents his recognizing at once the

exact situation of the defensive position to be attacked. In conclusion, the battle-field is rendered far more open to observation.

These advantages may be claimed equally by the troops employed in the attack and in the defence. Opposed to them there are certain disadvantages to be recognized. The uncertainty of the aim (determining the enemy's position) will be greater than formerly, which will detract from the advantage claimed for clearer observation. The difficulties of command will be enhanced by this circumstance; they demand a higher tactical ability and initiative from leaders of all ranks. The difficulty of recognizing the enemy's position will demand a more thorough reconnaissance, and render the command more than formerly dependent on reports of others.

It has been frequently maintained that the balance of advantage will rest with the defence on the introduction of smokeless powder. Certainly, the absence of smoke will benefit the well covered defenders more than the exposed attacking troops. The superiority of the defence in a prepared position, with a clear field of fire, will, when the assailants enter on a frontal attack, be greater than formerly. The attack will require more time, in order that the position, no longer defined by smoke-clouds, may be recognized, and the attack prepared by fire directed on it. It follows from this that the defence should never occupy sharply-defined positions, such as villages and the borders of woods. The attack will have to make more use of the ground to cover its troops and to prepare their advance more thoroughly by means of artillery fire. But the fact must not be overlooked that the defence, if it seeks to decide the fight, must make a counter-attack. The *rôles* will then be changed. From all this it appears that the relative values of the attack and the defence have not much changed. But it must not be forgotten that the value of the new powder does not rest alone on its freedom from smoke; of more importance is its increased power, securing a higher initial velocity, with its tactical consequences.

The increased power is considerably heightened, and, in fact, caused, by the simultaneous introduction of a small-bore magazine arm. We do not hesitate to attribute to this a far higher tactical value than to the adoption of smokeless powder. The low trajectory admits of the same accuracy of fire at 450 metres to 500 metres as was previously attainable at 250 metres; practically, at double the distance. Then the penetration of the small-bore bullet on living and dead objects has been found by experiment to be far greater; at 100 metres it will pass through 4 to 5 ranks; at 400 metres through 3 to 4, and at from 800 metres to 1,200 metres through 2 to 3. Lastly, the diminution in weight and size of the small-bore cartridge, which will admit of more ammunition being carried, has to be considered.

The general conclusions to be drawn from the experiences so far of the smokeless powder and the small-bore rifle are the following:—The fire action will begin at far greater distances than formerly; fighting in extended order will be the only form adopted, not only for the opening and carrying through of the fight, but also for its decision. Movements of bodies of troops in the vicinity of the enemy's fire will be more difficult; columns must no longer be exposed to it. The extension of front of the fighting troops, no less than the distances between the several lines and the reserves, will be increased. Direct advance on the enemy, without his fire having been previously beaten down, will expose the troops to destruction. Frontal attacks without simultaneous pressure on the flanks will not secure any decisive advantage. The deployment will have to be carried out earlier owing to the increased difficulty of reconnaissance.

The spade will be more than ever an arm in the hands of the infantry—even during the attack. It may, at the same time, be noted that earthworks, such as shelter-trenches, &c., must be given a far stronger profile, looking to

the increased penetration of the small-bore bullet. Whether night fighting will obtain increased importance, as is frequently maintained, is uncertain, for fire is of small importance on these occasions. In any case it is indispensable to accustom the troops to the peculiarities of fighting at night.

In Germany special attention continues to be given to the musketry training of the troops. A considerable sum of money has been taken for 1890–91 for the purpose of giving an extension to field-firing in varied ground, in which all arms will participate. It is pointed out that regular drill and practice grounds are useful for preliminary teaching; but that good training can only be attained by constant exercises on unknown ground with ball cartridge, the other arms being represented.

The year 1889 was of special importance for the French infantry. For the fifth time since the war the Drill Regulations have been altered, those issued the previous year having been withdrawn. The latest edition has the advantage of being shorter by 268 pages. It is divided into five *titres*. The most noticeable changes are to be found in Titre 3, "*École de Compagnie*." The formerly existing *école de demisection* and *école de peloton* are abolished. With the latter the old fundamental fighting formation of the company—*ligne de colonnes de peloton*—also disappears. Volleys in four ranks have been introduced, termed mass-fire. The company square is nearly like the German formation. An important change is that the company, when formed as a portion of other troops, whether in company column or in any other formation, can be deployed direct into the fighting formation, instead of having, as formerly, to form line of *peloton* columns first.

The deployment is carried out in the simplest way, without any preparation. The Captain names the subdivision or subdivisions to form the skirmishing line or the supports, and gives their leaders the necessary instructions. The supports follow the skirmishing line at the increased interval of 250 metres. The front extends to about 150 metres, with a company of 200 rank and file.

The *école de régiment* contains a large number of formal formations. In a chapter on the "Fighting Formations of the Regiment, the Brigade, and the Division, and the Functions of the several Lines," it is laid down that only general principles can be given, as it is not possible to lay down normal fighting formations, as these formations must vary with the circumstances.

The greater tactical bodies will generally be formed for the fight in two main groups, the strength of which will depend upon circumstances. The first forms the 1st and 2nd lines, the second the 3rd line; definite distances are not specified, but they are not to be too restricted. The front of a regiment is not to exceed 700 metres, of a brigade 1,400 metres, and of a division 2,100 metres, exclusive of intervals required for artillery. Each line has its special task. The 1st commences the fight, and carries it through; it does not manœuvre, and has not to think about the protection of its flanks. The 2nd line maintains close connection with the 1st; it protects its flanks, reinforces it, or extends its line. It further carries out the attack up to the assault if the 1st line alone is not sufficient, and finally drives forward again those portions of the 1st line that fall back and renews, if necessary, the attack. The 3rd line is the one to be employed for manœuvre, and it is retained under the immediate control of the Officer in chief command. It is kept in hand to meet all unforeseen eventualities; it provides the troops to make or meet flank attacks; executes or repels great counter-attacks; it covers the line of operations; prepares defensive positions in rear, &c.

One of the most important portions of the *école de régiment* is that concerning the fight of a Division. The Division is supposed to be advancing on one road, accompanied by its small train, and preceded by an advanced guard.

The Division comes in contact with an enemy who has taken up a position, and five separate phases ensue.

1st. The cavalry, having completed its task of reconnoitring, falls back, clearing the front, and watches the flanks and rear, keeping on the alert to seize any favourable opportunity that may offer in the course of the fight.

2nd. The advanced guard fights or takes up a position; the enemy is reconnoitred.

3rd. The artillery fight takes place; the main body moves up into the fighting line. The 1st line covers the artillery, and enters on the fight with the enemy's infantry.

4th. Preparation by artillery fire; general attack. The battalions of the 1st line attack, as their first objectives, advanced points, such as villages, heights, hamlets, &c., which are to be seized, assisted by artillery fire. When captured they are to be prepared by the 2nd line and the pioneers for defence. The regimental commanders have to watch specially the employment of the battalion reserves of the 1st line; the brigade commanders control the employment of the 2nd line. The Divisional commander indicates the position that the 3rd line is gradually to occupy. The troops told off to attack the flanks conceal their march as long as possible; on reaching the prolongation of the enemy's line, they must act with rapidity and decision. The Divisional commander directs the concentrated fire of the batteries on the decisive point. The direct attack follows with redoubled energy; so as to prevent the enemy evacuating his position a portion of the artillery accompanies the infantry.

5th. The assault, pursuit, or retreat. The advance of the troops detailed for the flank attack into the fighting line is the signal for the general assault of the position. If successful, the cavalry pushes forward in pursuit on the enemy's flanks. If unsuccessful, the third line, with the artillery and cavalry, has to cover the retreat.

In Russia, as in Germany, great attention has been given to firing with ball under service conditions. For this purpose detachments are formed consisting of 1 infantry battalion, 2 or 3 squadrons, and a battery, which manœuvre in accordance with a "special idea." Each infantry and cavalry soldier carries 12 or 15 rounds in the pouch, and the same number of rounds is carried in ammunition wagons (2 per battalion, 1 per squadron and battery). The battery has 9 to 12 rounds per gun. The exercise begins at a set of targets situated at about the distance that fire would be opened in war, and the advance is then made with fixed pauses at regular intervals.

Special importance has for long been attributed in Russia to night operations, in the belief that these will be extensively employed in future wars. They are, therefore, included in the programme of exercises for the troops up to the brigade. To facilitate assembly, each company has a lantern showing a different coloured light, according to its number.

Detachments have of late years been formed in almost every regiment, of men selected on account of their handiness and power of marching, under Officers having the same qualifications. Their functions lie in creeping through an enemy's outpost line, ambushes, and all the enterprises comprised in minor warfare. They have, further, to creep round the enemy's camp (especially at night) and alarm it in the rear, and they would take the place of cavalry in reconnaissance and scouting work in ground impassable for it. The report on the march of the 92nd Infantry regiment at the camp of Krasnoe-Selo gives a good instance of the great capabilities of these formations. After marching with the regiment over 26 miles, the detachment received orders to continue its march without a hot meal or any other relief for 48 miles more to the camp, which it was to reach within 24 hours; it actually performed this march in 21 hours.

The introduction of a small-bore magazine rifle into the Austrian Army

has been followed by the issue of new drill regulations for the infantry. Avoiding all hard-and-fast forms, it deals mainly with general principles well calculated to meet the requirements of the new arm. The necessity is inculcated for the most rapid and effective development of fire, the most skilful use of ground, while giving the utmost scope to the intelligence of the individual soldier and the initiative of the leaders.

The drill in the company forms the most important portion of the infantry soldier's training. The company is formed into 4 subdivisions. When these are placed side by side the formation is that of "deployed line;" when behind one another, at 6 paces distance, it is that of "company columns."

The battalions have 4 companies that work as such; there is no such thing as so-called battalion drill. There are only four normal formations: 1st, "mass," when the companies are formed, side by side, in column with 3 paces interval; 2nd, "line of columns," when in the same formation with deploying interval; 3rd, "deployed line," the companies being in that formation with 3 paces interval; 4th "column," the companies are in column behind one another at 9 paces distance. Changes of formation can be made in every company in any direction, at the halt or on the move. Movements under fire are always by the shortest way.

The battalion commander is responsible, generally speaking, for the proper application of the fire, for its concentration on selected objectives, for the reinforcement at the proper time of the companies engaged, and for the supply of ammunition.

In action, the battalion is divided into the companies ordered to form the fighting line, and the rest as a battalion reserve, from 300 to 400 paces from the reserves of the companies in the firing line.

The formation of the battalion reserve depends upon the nature of the ground and the effect of the enemy's fire. The movements of the companies in the firing line are to conform to those of the company of direction.

The regiment is formed of from 2 to 4 battalions. Only two formations are provided for assembly: 1st, the "concentrated formation," in which the battalions are formed in mass or column in one or several lines with intervals of 10 paces and distances of 40 paces between lines; 2nd, in "column," when the battalions are formed in column, one behind the other, at distances equal to the front, and 10 paces. In "fighting" formation the battalions are grouped in 2, 3, or more seldom in 1 line. The rear lines form the regimental reserve, and on first deployment the distances between lines are about 500 paces. The movements in "fighting" formation from medium distances (1,000 to 5,000 paces) are to be either directly to the front or to the rear, and to be regulated by the battalion of direction. No fixed distances are given for the extension of the front.

The second part of the regulations deals with the "fight." It is indicated that fire is the principal means of carrying it through; close order is only to be employed for the reserve and for feeding the firing line; also for those moments when a powerful impulse is required to push forward the skirmisher line, and when a decisive attack is to be made. Every fight is to be carried out on a regular plan, and all the available forces are to be brought up to the decisive point. The leading should never be passive; every commander must be impelled by the desire to adopt an offensive, energetic advance; in doubtful cases, the bolder action is always the best. The extension of the front must not be greater than is required for the greatest possible development of fire. The encounter, resulting from the meeting of two opposing forces on the march, must be distinguished from the attack of a regular defensive position.

As is also the case with the German regulations, it is distinctly laid down that "definite formations cannot be given for the attack—none are to be

adopted as normal formations." In connection with the defence of a position it is laid down that the pushing forward of troops in front of the general line of defence, for the purpose of offering temporary resistance, is to be avoided.

The Austrian regulations, also, attribute increased importance to the use of the spade, as a result of the introduction of the small-bore rifle and smokeless powder. To meet this, a special instruction has been issued directing that, in the construction of hasty entrenchments, the top of the parapet is to be made somewhat broader than the breadth of the spade. A further result of the small-bore arm is that, without any addition to the transport, 360 rounds, or 90 more than previously, are carried; of these the soldier carries 140 rounds—60 in the cartridge bag, 80 in the three pouches. The rest are carried in the ammunition wagons, the ammunition columns, and the field depôts. As in other Armies, field-firing has received a great development, and with excellent results.

*Cavalry Tactics.*

The compact drill and formality in the training of former days, which had in view only inspections and parades, has disappeared—or at least is in the course of doing so. The attention is now directed to the earnest reality—to war, which is inevitable sooner or later. Preparation for this forms the basis of all instruction. Riding in different ground of every kind, exercises under service conditions, by day and by night, exercises with units at war strength assimilated, as far as possible, to what would actually occur in war, have taken the place of repeated riding and drills on the exercise ground. The special branches of training, such as field duties, are no longer restricted to fixed periods of the year.

With the introduction of the small-bore rifle and smokeless powder, ensuring increased accuracy in infantry fire, cavalry has been threatened with a new danger. But in this, as in most novelties, the results as regards the effect upon cavalry tactics were at first much exaggerated. The increased power of the arm will probably affect them more than the absence of smoke.

Cavalry, therefore, in future must not shrink from taking its part in the decisive action. It is true that with the disappearance of the smoke-cloud, by means of which a surprise might be effected, an important moment will be lost to the cavalry. But this is one only of the necessary conditions to the leader of the first line; he will have to trust more to assistance from the ground. Human nature, the excitement of the gunners, the noise of the battle, and the fear excited by the charge of a mass of cavalry, which deprives men of their judgment and coolness, will always be on the attacker's side. The clearer view of the battlefield in future will put the leader in a better position for deciding the most favourable moments for the attack; the covering smoke-clouds hitherto have hidden both physical losses and moral defeat, and allowed an enemy to withdraw without exposing himself to tactical pursuit. In this way, perhaps, the power of cavalry will be increased. In any case there does not appear to be any necessity for changing the existing cavalry formations. But bodies in close order will have to keep still further off, and cover still greater distances in undertaking flank and turning movements.

In reconnoitring duties, also, no material modifications are called for; for the most important information will be derived from the cavalry while the enemy is marching, and, consequently, not shooting. Only when occupying fortified positions it will be necessary for scouts to ride with greater care than formerly.

With the solution, in the sense indicated, of the question as to the effect of the latest inventions on the action of cavalry, the last doubt is removed as

to its value employed in masses on the battlefield. It is the unanimous opinion of those qualified to judge, in every European Army at the present time, that there is a great future before it, in spite of the power and precision of modern guns and rifles. It is self-evident that it can no longer attack, with any hope of success, intact infantry—but neither could it in the days of Frederick the Great and of Napoleon. It is recognized, also, that the conditions of success have become more difficult; but so they have in the same degree for the other arms. Open ground at great distances must be avoided, and covered ground sought for and carefully utilized. The losses will be greater, often considerable; that must be accepted as a part of the bargain; the infantry and artillery do not suffer less under the murderous fire of the modern battle; the attack must be prepared, that is it can only be undertaken when the enemy's infantry has been shaken by fire.

It is evident that nowadays, when large masses are employed on the field of battle, the isolated action of small bodies—that is, of squadrons and even regiments—cannot produce appreciable results. As is already the case with infantry and artillery, so also the cavalry must be kept together in masses. As everywhere else, so here, to break it up cannot but be disadvantageous. Although the formation of cavalry corps generally has been long discontinued, still circumstances will lead to the timely junction of several Divisions for special objects under a single command. Thus, during the last two years, both in Germany and France, exercises have taken place in the employment of great cavalry corps, that is, several Divisions combined.

Endeavours continue to be made to arrive at the best tactical formations, which will ensure the greatest mobility, the most rapid deployment, and the least possible losses. Whereas formerly, by adopting certain formations, the enemy was to be kept in ignorance regarding the intended point of attack, and surprised by a series of evolutions following rapidly one after the other, ending in the attack of his weakest side, it is now clearly recognized that only the simplest formations are possible. That cavalry will not surprise the enemy which manœuvres the most skilfully; but that which goes most directly to its objective, deploys the most rapidly, and strikes its enemy at the sharpest gallop before being struck itself. It is precisely the simplicity of the formations that will favour these points; consequently those to be actually used are very limited in number, and are the simplest imaginable.

The grouping of a portion of the regiments in cavalry Divisions, even in time of peace, formerly considered so necessary, has now fallen into the background as a secondary matter, almost entirely administrative. Germany is breaking up two of her existing three Divisions, and Russia proposes to attach a portion of her Divisions by brigades to Army Corps in the event of war. It will only become the more necessary to exercise regiments in Divisional bodies as often as possible.

Incited by the intention in Russia to attach a brigade of rifles to the cavalry corps to be formed in war, so as to give it a greater power of resistance, the question of attaching infantry to cavalry Divisions has again been freely discussed. Seeing that the cavalry is armed throughout with a good arm, the necessity for this permanently, does not appear; but it may be very practical, temporarily, under special conditions.

Attention continues to be more generally directed to night fighting. Important before, it appears now indispensable, when modern firearms render the deployment and approach to the enemy's position more and more difficult, and the losses greater. The thorough preparation for it, of all arms, even of the cavalry, is required; the exercises in this respect hitherto do not suffice. The action of cavalry in night fighting is not so limited as might at first sight appear. Ziethen's turning movement; Stuart's enterprises in the

American War; and the Russian cavalry in 1877, prove sufficiently that cavalry in large bodies can be brought up to the enemy in the dark unobserved, even in difficult ground.

The cavalry must not omit its scouting duties at night, nor allow them to be limited to the roads. The darkness imposes increased demands on the intelligence and handiness of the patrols; only repeated practice can fit them for it. Even the charge at night is by no means excluded, though the direct effect of the arm is less than by day. Clear nights, on pretty open or known ground, a light coating of snow, &c., are favourable conditions. Secondary undertakings during the attack of infantry, which aim at gaining the flanks or rear of the enemy, may also be undertaken, as well as independent raids.

As regards arms, the reintroduction of the lance must be insisted on. The entire German cavalry is now armed with it; the French regiments are still experimenting with it, which must lead to its partial adoption again. The universal introduction of a small-bore magazine carbine is only a matter of time and money.

The swimming of cavalry should not be neglected. Local circumstances place many difficulties in the way of doing it. What should be aimed at is to swim whole squadrons and regiments without special preparations. The clothing and equipment can be sent over in boats, or on quickly-constructed rafts, men and horses swimming over more or less bare. The bad swimmers can be brought over by ropes or in boats. In any case it is useful to make the squadrons acquainted with the different ways of managing, and the dangers of each, so as to be able to overcome the difficulties that arise, even at the cost of some losses. Even if only a portion of the men and horses attain to a certain proficiency, this alone would be a great gain for patrol work.

In Germany both the detailed trainings and tactical exercises are based more and more on war requirements. The programme embraces all branches of training, from that of the individual man to that of cavalry corps of several combined Divisions; drill and manœuvre practices against all arms; thorough instruction in field duties, especially in combination with other arms; night exercises in bodies at war strength; shooting, both individual and field practices, the latter with other arms; fighting on foot; swimming; pioneer and telegraph duties.

As regards tactical formations, the regulations are of course the guide. But in practice, the formations employed are limited to the very simplest. A number of movements still contained in the regulations are hardly ever employed. Superiority is sought for, not in the employment of numerous and complicated movements, but rather in the surest, quickest, and most concentrated execution of the simplest movements.

In France, one of the weakest points in cavalry organization is in course of being remedied by the establishment of remount depôts, where the remounts will be broken previous to being drafted to regiments, the strength and efficiency of which will be commensurately increased. The improvement does not extend to the men, whose service is now limited to 3 years. As regiments must be prepared to march to the frontier within 24 hours without waiting for their Reserve men, this is a weak point.

In Italy, a new cavalry drill book has been published, distinguished by great simplicity and by the small number of technical forms. In all the formations, their application in the field as well as on the parade ground has been kept in view. Great importance is given to maintaining the proper direction in following the leaders.

The cavalry Division is composed of 2 brigades of 2 regiments of 6 squadrons. The instructions for its employment in combination with horse artillery

are almost exclusively the same as those contained in the German regulations. It is formed in mass of brigades or regiments one behind the other on reaching the zone of the enemy's operations, provided the country favours rapid and free deployment. As the moment for action approaches, the first line is formed of 12 squadrons for the principal shock, supporting and flank squadrons for independent action; at 250 metres distance, the second line—of 6 squadrons—outflanking and supporting the first line, and to make or meet flank attacks, the third line—of 6 squadrons—overlapping or behind the centre. The first and second lines advance in line of columns, and only form line when the front of attack and the direction are definitely settled on, or when forced to do so by artillery fire. The third line is kept in hand in mass. The horse artillery supports, especially in seizing defiles, in defending points to be temporarily held, and to prepare the cavalry attack.

The following deductions concerning the Russian cavalry are drawn from the criticisms contained in a number of publications by experienced Officers in Russia during 1889. The conditions as to the distribution of cavalry, which extended even to breaking it up sometimes into separate subdivisions, quartered in farm-houses with bad stabling and lodging, and with equally bad communications, have been rendered still worse through the cavalry having been pushed further towards the frontier. There are no riding schools available at out quarters, and instruction in riding seldom takes place oftener than two or three times a week, almost entirely in the open. The squadron commanders are occupied with every kind of interior economy work, such as the purchase and charge of food and forage. The qualifications for recruits have now been made higher; but up to the present, the standard, both physically and mentally, was low, and recruits frequently did not understand the language. For the sake of economy, they are not called up before the end of December or the beginning of January, thus barely four months are available for their training. The instructional Staff are insufficient, and are for the most part not well adapted for the work, and the instruction is not good. Riding over obstacles and in rough ground is almost unknown. As there is not much riding, to fill the time much infantry work is learnt. The spirit of the men as cavalry soldiers is, therefore, but little awakened, and their value as such is injuriously affected. The horses also are not in a condition to satisfy the requirements of war. The squadron commanders think less of real efficiency and condition than of keeping their horses as sleek as possible for the quarterly inspections.

An order by the Inspector-General of Cavalry directs that during special cavalry manœuvres special attention is to be paid to movements in mass with tactical ideas, and indicates the following as worth special attention:—Movements for long distances in concentrated reserve formations; changes of direction upon signals with the sword; rapid deployment from reserve formation into line during the march, so as to accustom the leaders to give rapid and clear orders and the men to execute them quickly; exercises in the attack of cavalry, flank attacks, and meeting these; attacks on infantry, riding right through to their reserves; rapidly passing defiles of different kinds, even when troops are in deployed line. All these exercises are ordered to be against a marked enemy, or one force against another.

Respecting the employment of the Russian cavalry in war, the intention is still to act strategically in masses. The combination of nearly all the European regiments in large bodies, and their increased readiness for war on the frontier, points with some certainty to their employment in a great measure at the commencement of operations. According to "Streffleur's Military Magazine," the intention has been for some time past to form in war 3 cavalry corps each of 2 Divisions, with horse artillery, and to attach to each a brigade of rifles to give it the required power of resistance. The order for

the doubling of the 5 European brigades of rifles has been given, and a further increase is designed. By their distribution, they have been brought into connection with the cavalry Divisions concerned. These corps would undertake great strategical movements against the frontier of East Prussia and the north-east and east frontiers of Galicia.

Night exercises were practised especially at the Krasnoe Selo camp. The 4th cavalry Division carried one out on an extensive scale during the manœuvres of the 4th Corps in the Wilna district. While the main body of the Division (18 squadrons, 4 guns) advanced against the front of the enemy at Glonin, behind the Chtchara, a selected detachment, consisting of 6 Officers, 14 non-commissioned officers, 186 horses, and 2 guns, was detached to destroy the railway stations of the Baranovich—Brest-Litovsk and the Baranovich—Polesic lines, so as to hinder the arrival of reinforcements. The detachment was provided with explosives and tools. In going, it covered 71 miles in 20 hours, and was back in camp in 40 hours, having marched 119 miles.

Swimming was also practised. Two sotnias of Cossacks crossed the Dnieper, where it was nearly 1,000 paces broad. The horses were stripped, and the men swam with them, their clothing being brought over in pontoons. The horses were ridden into the stream, and when it was sufficiently deep the men slipped off and held on to their horses' manes or tails.

### *Field Artillery Tactics.*

The year 1889 was an important one in all Armies, but especially in the German. The most important points were, the general introduction of smokeless powder, the issue of a new drill book in Germany, and the new organization of the German field artillery. Though the actual adoption of smokeless powder has not been carried out in all the Armies, still experiments with it were so far advanced that there is no doubt it will be employed in any future war. It has been shown that, though there is still a smoke-cloud, it is so thin that a skirmishing line cannot be seen by it beyond 200 to 300 metres, and, though visible with artillery fire at the moment of firing, it disperses at once. Artillery therefore gains the advantages of clear sight, both for observing and laying, and of being much less visible to the enemy, provided it is judiciously posted, so as not to show up on the sky line. The advantages will be as against infantry and cavalry; against artillery the enemy's guns will be similarly situated. It follows that the artillery engagement must be more thoroughly carried through than before, until the guns of one side or the other are completely crushed. Even after this has been done, the preparation for attack by artillery fire on selected points of the enemy's position must be more complete than formerly, for the fire effect of unshaken infantry armed with the small-bore magazine rifle and with smokeless powder will be enormous.

But there is another advantage gained for artillery by the use of smokeless powder, that the intervals between batteries and guns can be materially diminished, so that positions for massed batteries will be more easily found.

In case of necessity, guns can even be placed in a second line, in advance or behind the main artillery line, if safe positions exist.

The new German Drill Book (1889) starts from the fundamental principle (as did the Infantry Drill Regulations) that in war only what is simple leads to success, and consequently a number of formations which were superfluous in the field, and were entirely reserved for the exercise ground, have been swept away. But, on the other hand, the complete mastery and precise execution of the few simple formations that are necessary is insisted on. Open division column as well as half column are omitted; the only formations for movement are line at full intervals, battery column (of single

guns) and, under certain circumstances, division columns. Whereas former regulations were based on the peace battery of 4 guns, the new ones deal with the war battery of 6 guns and the 4 wagons forming the first line.

The principles of employment in battle have not changed materially. The instruction is new by which, before advancing into the first position for coming into action, a preparatory position is to be taken up where all the preparations for favouring fire being opened rapidly are to be made. Later on, batteries coming into action in open ground are to avoid as far as possible taking up a position near and in line with a spot already fired on by the enemy's batteries. The battery commanders are to precede their batteries, and to accompany the brigade-division commander to settle on the position to be taken up; they then return, and lead their batteries into it. The brigade-division commander remains in the position to observe the enemy.

As regards the supply of ammunition, that in the limbers is to be left intact as long as possible. The ammunition wagons of the first line move up to the line of guns without waiting for the order, and are placed behind the right flank gun of each subdivision. The limbers can be taken back to a more retired position, so that the horses may not be exposed to fire; they are joined there by the teams of the wagons.

In a rencontre engagement in which neither side is holding a selected position, the first points are rapidity in movement and in firing, so as to crush the enemy's artillery fire from the outset. In attacking an occupied, and perhaps prepared, position, it must be borne in mind that the only chance of success lies in establishing a superiority in the artillery fire. It must be especially insisted on that, to prepare effectually for the infantry attack, it is necessary for individual batteries to accompany the advance up to the shortest ranges, and that, looking to the moral support this will afford, losses are not to be shunned.

In the defence, a preparatory position is recommended, even when the position is artificially prepared. If possible, the position should be improved by preparing the communications, ascertaining ranges, the construction of earth works for the protection of the guns and men, improving the field of fire by clearing the ground, and the construction of masks. There should be an ample supply of ammunition in the immediate vicinity of the guns. As a rule, the whole of the guns will be directed in the first instance on the enemy's guns; but they must be turned on the infantry the moment they begin to advance, regardless of the artillery fire.

*Tactics of Fortress Warfare.*

The two subjects that have attracted most attention have been the application of smokeless powder, or, rather, powder that produces a thinner smoke-cloud than that in use, and the employment of armoured towers in the field and in fortress war. In a lesser degree, the advantages and disadvantages of the new powder when employed with an army in the field apply also to fortress warfare. The attack will have the advantage of being able to command and direct operations with greater clearness and certainty. The defence, on the other hand, will be freed from the hindrance to aiming of the thick smoke-clouds that in some conditions of atmosphere now interfere materially with the efficiency of fire. In other directions, the conditions applicable to a Field Army really apply equally to fortress warfare, which is now closely assimilated to other fighting, by the changes of position of the fortress and siege artillery.

The construction of the Schumann armoured towers and armoured carriages, of a sufficiently portable character to allow of their employment in the field, is another step towards the conversion of operations in the field

into a war of positions. Their value for the strengthening of a weak position, or of a position occupied by an inferior force, is undoubted. Assuming their employment, it is evident that it must be followed by the presence with an attacking army of a heavier artillery than that of the batteries now employed. The movable armoured towers are designed for quick-firing guns, and they have been found proof against the existing field guns and even shell from the 15-cm. howitzer.

The quick-firing guns are of 37 mm. calibre, with a range of 3,400 metres, and 53 mm., with a range of 5,600 metres, and the latter can fire from 35 to 40 rounds a minute, the case shot fired containing each 80 bullets.

In other directions, comprising the organization of special fortress troops, the development of telegraphs and telephones for perfecting the communications, the use of balloons for observation, and the electric light for searching ground at night, considerable progress has been made.

## GRUSON EXPERIMENTS WITH SMOKELESS GUNPOWDER C/89.[1]

Translation from "Deutsche Heeres-Zeitung," of 27th August, 1890.
By Captain BRITTAN, R.M.A.

THE latest reports of the firing trials at Gruson's works, which I have before me, contain the results of the experiments with smokeless powder C/89. They were carried out with the following guns :—3·7-cm. Q.-F. of 23 calibres length, mounted on a field carriage ; 5·3-cm. Q.-F. of 24 calibres length, on a non-recoil cone mounting ; 5·3-cm. Q.-F. of 30 calibres length, on a field carriage ; 5·3-cm. Q.-F. of 40 calibres length, on a ship's mounting ; 5·7-cm. Q.-F. of 25 calibres length, on a non-recoil cone mounting ; 7·5-cm. Q.-F. of 25 calibres length, on a casemate mounting ; 8·2-cm. Q.-F. of 35 calibres length, on a ship's mounting ; 12-c.m. Q.-F. howitzer of 12 calibres length, on a field carriage ; 12-cm. spherical mortar, in a shielded emplacement.

The charge consisted of smokeless powder C/89 in cubes of ·039, ·059, ·078, ·118, ·157, ·197 inch length of side ; but, in order to obtain comparative data, some old kinds of powder were substituted, viz. : rifle powder (only for the 3·7-cm. Q.-F. gun), large-grained powder (·118—·275-inch and ·157—·354-inch size of grain), fine-grained gunpowder, and ordinary gunpowder C/86. The charges for the quick-firing guns were contained in brass cartridge cases, and for the mortar in cartridge bags.

The powder C/89 causes a feeble brownish cloud which, however, is so thin, that immediately after a discharge the next shot can be aimed, as the target still remains distinctly visible. Even in heavy rainy weather these brownish clouds disperse in less than three seconds, whereas black powder collected in front of the gun a cloud of smoke which hung about a longer time and rendered a rapid fire impossible. The combustion of the powder C/89 leaves very little residue, so that the bore remains almost clean ; the heating of the gun and cartridge case is also sensibly less than with black powder.

The comparative trials show that the C/89 powder per weight of charge is from three to four times as powerful as the old kinds of powder.

The crusher gauge for measuring the pressure was placed either in the cartridge case, *e.g.*, in the base of the projectile with armour-piercing shells, or in the breech of the gun, *e.g.*, in the breech mechanism with the 12-cm. mortar.

We confine ourselves to collecting from a large range of trials the more important results.

The 3·7-cm. Q.-F. gun L/23[2] with a charge of ·077 lb. of smokeless powder C/89 in cubes of ·039-inch size, and a ·99-lb. heavy common shell realized a muzzle velocity of 1588 feet per second and a mean pressure of 13·07 tons.

The 5·3-cm. Q.-F. L/30, with a 4·4 lb. heavy common shell and ·287 lb. of smokeless powder C/89 in cubes of ·059-inch, gave a muzzle velocity of 1578 with 14·44 tons pressure.

The 5·3-cm. Q.-F. L/40, with the same projectile and a charge of ·33 lb. of smokeless powder C/89 in cubes of ·078 size, gave a muzzle velocity of 1378 with 4·67 tons pressure. A charge of ·59 lb. of the same powder, however,

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[1] The abbreviation C/89 signifies composition 1889.

[2] The abbreviation L/23 signifies a gun of a total length of 23 calibres.

realized a muzzle velocity of 2080 with 14·2 tons pressure. For comparison, the same gun was fired with a charge 1·35 lbs. of ordinary gunpowder C/86 and a 4-lb. armour-piercing shell, giving a muzzle velocity of 2008 and a pressure of 11 tons. The gun of only 24 calibres length firing a 4·4-lb. heavy common shell with a charge of ·287 lb. of smokeless powder in cubes of ·059-inch size produced a muzzle velocity of 1447 with 12·84 tons pressure.

The 5·7-cm. Q.-F. L/25, with a charge of ·496 lb. of smokeless powder C/89 in cubes of ·078-inch size and a 5·99-lb. common shell, realized a muzzle velocity of 1572 with a pressure of 13·66 tons. If, however, the charge was only raised to ·507 lb., the muzzle velocity increased to 1595, and the pressure to 14·36 tons.

With the 7·5-cm. Q.-F. L/25, firing a charge of ·661 lb. of smokeless powder C/89 in cubes of ·118 inch, and the heavy common shell weighing 13·2 lbs., a muzzle velocity of 978 was obtained with a pressure of 2·4 tons; doubling the charge raised these figures to 1650 and 12·7 respectively.

When using the ·157-inch cubes of the same powder and a charge of 1·43 lbs., the corresponding figures amounted to 1604, and 10·52, or with a charge of 1·65 lb. to 1837 and 14·8 respectively.

The 8·2-cm. Q.-F. L/35, firing the heavy armour-piercing shell of 15·4 lbs. with a charge of 2·22 lbs. of the new powder in cubical grains of ·197-inch size, gave a muzzle velocity of 1946 and a pressure of 10·63 tons; by increasing the charge to 2·78 lbs., these numbers became 2270 and 15·3; when, however, ordinary gunpowder C/86 is employed, the charge had to be 5·5 lbs. to reach a velocity of 2231, with a pressure of 17·98 tons.

With the 12-cm. Q.-F. howitzer L/12, a charge of ·243 lb. of smokeless powder C/89 in cubes of ·059-inch size, imparted to the heavy ring shell (36·2 lbs.) a muzzle velocity of 387 with a pressure of 1·15 tons; by augmenting the charge to ·9 lb., these figures become 1093 and 12·97 respectively. With the same gun and projectile, but using a charge of 2·2 lbs. of black large-grained powder of ·118—·275-inch size, a muzzle velocity of 886 was obtained with a pressure of 9·94 tons.

The 12-cm. spherical mortar, with a charge of ·53 lbs. of the new powder of ·039-inch cubes and the heavy ring shell of 36·2 lbs., gave a muzzle velocity of 732 with a pressure of 6·89 tons: when using fine-grained powder, a charge of 1·1 lbs. was necessary to attain with the same gun and projectile a muzzle velocity of 584 with a corresponding pressure of 8·87 tons.

The comparative results show unmistakably the superiority of the smokeless powder C/89 over black powder, and of this the shooting trials at Gruson's works have produced a fresh proof.

The most modern gun of their own construction employed in these experiments is the 8·2-cm. Q.-F. L/35, on a central pivot mounting. The gun itself is a jacketed hooped gun of forged crucible steel.

With the Gruson quick-firing guns only one man is required for laying, loading, and firing, and one for handing the ammunition, and as a relief. The shooting trials at Gruson's works take a foremost position in the province of artillery, and are the object of constant and widespread attention in military circles.

# THE GERMAN AUTUMN MANŒUVRES, 1890.

By Major Otto Wachs, Z.D.

The manœuvres which took place in August and September last, and in the year before, have for two reasons given many interesting results; one is *powder with little smoke*, and the other the *magazine rifle with small calibre*. For brevity, we will speak of them in our article of to-day as new powder and new rifle. Both have brought *tactical* and *technical* innovations.

We will try in the following pages to give a short account of the results of our own experience, and the opinion of competent judges.

The manœuvres began as usual in August with the exercises of *regiments* and *brigades;* then followed operations of the *detachments*, representing skirmishes founded on the principles of war. Each party is generally composed of three to four battalions of infantry, two to three squadrons of cavalry, three batteries of artillery, and a detachment of pioneers.

The Commanders of the detachment are given their tasks by the leading Officer, who usually has the rank of General; they form their resolutions according to them, and lead the troops by day and by night. After the combat has taken place, the leading Officer criticizes everything concerning the command, the behaviour of the three arms and that of the outposts. On this occasion the leading Officer gives the decision as to which of the parties has fulfilled its duties, and which way would have been shorter or better. German discipline does not allow the judgment of the leading Officer to be contradicted. The umpires can give only the result of their observations, what they have seen during the action, before or after the criticism of the leading Officer, but the decision rests alone with him.

We come now to the grand manœuvres—brigade against brigade, division against division or against a marked enemy, army corps against army corps, or, as took place in Silesia under the command of the Emperor, two army corps against a marked enemy.

During the exercises of detachments, and during the grand manœuvres, we had occasion to observe new tactical forms in the three arms and in connection with each other; but not the forms alone have altered, new principles have appeared.

We begin with the "queen of battles," with the *infantry*.

The *low trajectory* of the projectile from the new rifle, its *accuracy* in hitting the aim, and its *wider sphere* of activity, have caused the *distances* to be *increased* from where the beginning of the action takes place. The "old school" cannot longer hold its own against the new time, new weapons, and new principles. This *soi-disant* old school taught that the infantry only could have any effect on the enemy when it approached it as nearly as possible, and thought it not necessary first to shake the enemy by the fire of the artillery and infantry. It was on the 18th of August, 1870, on the battlefield of St. Privat, where the Prussian Guard had to pay with so many lives

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Note.—Owing to pressure of time, the proof was not submitted to the author for correction. Those errors which were obvious have been, as far as possible, corrected here.—L. A. H.

the adherence to this old principle. But even when the "needle-gun," with its shorter range, could be used for such a reason, the "Mauser gun" never could; it and the magazine rifle have completely superseded it.

Till the beginning of this year it was thought a tactical fault if troops began to fire at a greater distance than from 400 to 500 metres. This has been altered suddenly by the "Terturen," that is to say, by the supplements to the "Felddienst-Ordnung." These supplements say plainly that it is forbidden for columns and lines to stand unsheltered if within range of artillery and infantry fire, and they order to begin firing at greater distances than before. These two directions change at once the tactics of the columns and of the lines into the tactics of the shooters. According to the new rules, the infantry fought in the first line in swarms of shooters, and where the country was favourable the troops were allowed to rally. Years ago, no one would have imagined that the time was so near that, as happened in the last manœuvres, ten companies of one regiment were engaged as shooters, while only two remained closed as a reserve. It happened that when an army corps was in action, whole brigades fought in masses as shooters. The new directions also have caused the former divisions of an army—the Treffen—to disappear; and the Treffen of to-day are nothing but reserves in rear, to make good the losses in the first rank. In consequence of the wider sphere of all projectiles from cannons or rifles, the distances between the troops of the first and second line, or, to use a technical expression, between the echelons, have become greater, and are now from 400 to 500 metres. If we reckon the distance at which our shooters begin to fire at the enemy (600—700 metres), we see that from the enemy in the first line to our reserve a distance of from 1,000 to 1,200 metres remains.

The distances given here are for a sheltered country; many Officers think that they must be larger if one is obliged to fight in an open country, otherwise the losses of men and horses would be too great. We have already seen that in fights only with shooters in the first line, and have given the small troops following different loose formations to have a chance against the projectiles. One formation, to give an example, is that the troop has only two men in front; the humour of the soldiers calls this formation earth-worms. We cannot think such deep formations advantageous to-day, where the projectiles of a rifle have penetrating force enough to kill three and four men behind one another at a distance of 400 to 500 metres. And what mischief would effect the fire of artillery!

As we are speaking of the field of battle, we must not forget that the infantry has great skill and dexterity in throwing up *earth-works*. One we saw rise in fifteen minutes; it had a strong outline or profile. This field limit was for shooters lying down, if for kneeling ones, from 30 to 40 minutes are required, and if the shooter is standing, from an hour to an hour and a half. But the infantry which resolves to hold its position is not satisfied with digging one limit, but wherever the ground allows it, limits are raised one above the other. Earth is the best material to shelter against the projectiles of infantry, but the outline must be nearly 1 metre thick. A brick wall of the thickness of the walls that surround villages, and trees in general, are little worth against the new rifle, which is the reason the defender did not use these objects as coverings and established rather a wall before them. But not the defender alone threw up walls, the aggressor did the same when halting for awhile; in the hand of the one as well as of the other the spade has become a weapon. Before one position we saw pioneers draw strong wire round posts or stakes, and from tree to tree, in order to detain the enemy under the strongest fire and to prevent the passage of cavalry. The wires were from 0·50 metre above the ground, and afforded a good hindrance.

We will not forget to mention the little *towers, armed with a coat of mail*,

and constructed by the late Lieutenant-Colonel Schumann. These towers were first used in the manœuvres, 1889, near Hanover. Eight of them were transported to a position of nearly 3 miles, at which were prepared walls, sheltered positions for artillery, &c. He found that the difficulty in bringing the towers into position was not great, and also that their value in the field was very considerable. They were used to strengthen weak points. Their cannons have a calibre of 3·7 and 5·3 centimetres, and fire bomb-shells, grapeshot, and shrapnel at a distance of 3,500 metres, firing forty shots in one minute. Only two men are necessary to serve the guns. Since the new powder is used the artillerymen are able to breathe in the tower, even when they shoot quickly. It has not yet been decided if these towers shall be used in a campaign on account of the bulk of the material for their transport and the ammunition.

With respect to the *arrangements of firing*, we have to say that this became less difficult than it was before, as the Officers see their soldiers and can influence them morally, as there is no smoke, a circumstance that is very significant. The rule has been followed by the fire-leading Officers to economize the ammunition of the soldiers, whilst the distances from the enemy are great, but to begin a hot fire when about to storm. Troops without cartridges are defenceless. If there should be a large target, though distant, visible only for some moments, as, for example, a battery in movement, one must fire rapidly at it. The smoke of the rifle is as little as when one lights a cigar; in damp weather the powder smokes a little more, and is visible for a longer time. The individual shooter, who is no longer veiled in smoke but to be seen if not sheltered from the enemy, is forced to do his utmost to profit by any shelter. Some regiments had fastened a little staff of iron near the muzzle of the rifle to rest the gun when shooting in lying down.

The instances of *marching* were extraordinary, and to prove them we accompanied a battalion which marched that day at least 25 miles. The weather was then very hot, and the troops had not only to march over sandy ground, to pass hedges and walls, but to fight, and yet we did not see one straggler. Another battalion marched one day, nearly always engaged, 15 miles, was then commanded to the outposts, from where it was sent at 9 o'clock P.M. to venture upon an enterprise against the flank of the enemy. This troop returned into the bivouac at 3 o'clock A.M., after having marched 16 miles. At 6 o'clock A.M. the marching, fighting, &c., began anew, and on this day another 17½ miles must be marched. This battalion has in a short time marched 47½ miles, and that under difficulties. In this place we will mention that there are two sorts of marching, the *travelling march* (generally 14 miles on one day) and the *war march*, where no comfort is allowed and all is prepared to fight instantaneously. A regiment of infantry travels over 1 kilometre in about twelve minutes.[1] But the results such as those above only can be obtained by systematic training and control of everything on which the health and strength of the soldiers depends, and by the strictest observation of the discipline of marching. The secret of the result lies in the hard service of Officers and non-commissioned officers, who do not rest till their men are as comfortable as possible and till the soldiers have prepared their meals in the bivouac or in the quarters, if the men are provided out of stores, which is sometimes the case in the manœuvres, and is a proof as good for the Intendance as for the men.

This year the German *cavalry* was for the first time equally armed with lances. This weapon has many adversaries in the army, because it is said to be inconvenient for man and horse, to burden the horse and make it difficult to place the carbine as well as to fight on foot. The cavalry will get the new

[1] Over 3 miles an hour.

carbine (model 1888) next year. In some regiments experiments are being made with a new saddle.

The *strategical* service of the cavalry, that is to say, the service of information on which the Commander-in-Chief bases his resolutions and the plan to fight, has become very difficult on account of the new powder. When it was possible two years ago by small patrols of cavalry not only to find the enemy, but also to get information concerning his designs, it is to-day hardly possible to push cavalry near the enemy's position without sacrificing it, as it will be destroyed by shots before it has seen the enemy. The cavalry does not remark any smoke, and, though it hears the rifles and guns, it does not know from where the danger is, and it is impossible to learn by the ear the position of the shooting enemy when he is standing at different points and the detonations begin to fight with each other. And yet the cavalry must be, as it were, in the future the eye of the Army, but an eye which is willing at any moment to sacrifice itself. More difficult still to fulfil are the claims which the battlefield requires if it must act against artillery and infantry.

On some occasions we saw cavalry fight on foot and have influence on the result of the day; it happened to occupy important positions, and was able to hold them till infantry and artillery could arrive; another time, a pass far from the position was occupied during the night, and through this pass, which it secured, the infantry debouched the following morning; sometimes it succeeded in laying an ambush.

The perseverance in *marching* was very great, and after the manœuvres we found the horses in good condition. On one day a cavalry brigade was sent to flank the enemy, the distance ridden was not less than $37\frac{1}{2}$ miles, $\frac{1}{3}$ of which were through a narrow, hard way, ridden a long time in compact columns at one side, of marching infantry and artillery. To pass this last distance quickly, the brigade was forced to trot incessantly. Three squadrons of hussars had to pass the Föhrde (sund) of Flensburg, near Ekensund, which is here 114 yards broad; two squadrons were transported in ferry-boats, but the horses of the third were unsaddled, and swam through the sund, led by the hussars from boats; in two and a half minutes the horses swam through.

With great interest the cavalry manœuvres took place in August, where the Guards were engaged, as well as the manœuvres of two divisions of cavalry in September. With the first exercise four regiments were employed on each side, supposed to be the vanguard and rearguard of two armies; these manœuvres were therefore very instructive, as the two Commandants alone knew where the troops should be in the night. The exercises demanded no long marches, but were extended very widely; small detachments had to swim often through the Spree. The two cavalry divisions which fought against each other were twelve regiments of cavalry strong, thirty-six guns, two battalions of infantry, pioneer, and telegraph detachments; these exercises took place between the Saar and the Mosel.

Just as significantly as the two arms spoken of, the new powder influenced the *field artillery*. To find out the distance between the enemy and our own position has become easier, as no smoke on our side hinders observation: it has also become difficult, because the lines of the enemy are not defined by smoke. If the artillery of the enemy is sheltered, and fighting has begun, one cannot find it by the sounds, and in time of war we are obliged to try to find the artillery which aims at ours by the lines which are made by the projectiles of the enemy in the ground. In order not to betray our position it is dangerous to change it (the reglement warns directly for change of position) if there are no pressing circumstances. But when a change must take place, then the artillery wants more scouts than in old times, who look for a

new position and for the best way to reach it. More than ever the artillery must profit by favourable moments, and fire then as quickly as possible. As the rifle reaches farther now, the artillery is obliged to be more than ever prepared against infantry, and it is no longer able to unlimber the guns and to hold its position against the fire of infantry at distances of from 1,000 to 1,200 metres; this would be ruin. Shooting exercises with ball ammunition had the result that a company of 250 men, with only ten cartridges for every soldier, was able in fifteen minutes, at a distance of 1,300 metres, to destroy a battery. In the same manner as the seeing and aiming at artillery has become more difficult, it has become easier concerning infantry, which oftener must change position. Only the artillery of two German army corps used the new powder during the manœuvres. One saw very little smoke, but remarked often a fire-flash that came from the muzzle, and the position of the cannons was betrayed when before them either was sand, which whirled after the shot, or if dry grass began to burn. The artillery was used in the manœuvres when possible in great masses, and in the field one hopes to gain the victory by the better practice in shooting.

*Pioneers* who had prepared the position for the artillery afterwards served it as guard.

More than ever this year were undertaken *enterprises at night*, generally going out from the gros of the outposts. The night was chosen to avoid the great loss of lives caused by the new powder and rifle, but these enterprises were undertaken to surprise the enemy and to obtain a commanding position for the action of the next day. Such a night expedition lays highest claims to the discipline and order of the troops. Speaking of these enterprises, we must observe that one does not intend to fight night battles in the future, a view which does not put out the possibility of assembling before daylight, and with daylight to begin with superior forces a decisive battle (Tel-el-Kebir).

For some years, and also this year, many troops were given the *baggage*, or a part of it, to accustom the leading Officer and the troops to these *impedimenta* (carriages of ammunition, of medicine, the columns of provisions, the detachments of telegraph and telephone, &c.), which lengthen the marching columns and make them less movable, which must be sheltered on the march as well as in the bivouac and in the cantonment. If these trains were with the troops or not, in any case the orders for marching, fighting, &c., must be exactly the same as it would be in war time, when all the trains are with the army.

Whilst the infantry of the IXth Army Corps bivouacked *under tents*, it was only allowed in the XVIth Army Corps to take in the manœuvre, for Officers and men, the same things as in war, and in no bivouac did we see *one tent;* the Officers were lying at night near the men in the open air. When the troops had the carriages of ammunition with them, the *supplying of cartridges* was practised. That this supply shall take place at the right time is the duty of the Commander of the battalion; he has to direct the carriages behind the line, and to take care that ammunition is brought to his companies in the first line by soldiers who are trained for this service, or by the reinforcements which are sent there. In war the soldiers take the ammunition of the dead and wounded, and fill all their pockets with cartridges. It depends on the country and on other circumstances where the carriages of ammunition are placed, but, at all events, it must not be difficult to reach them.

A short time after one has arrived at the cantonment, Officers and non-commissioned officers have to make themselves *acquainted* with the place and the country round it, that they may be able to give at every moment a disposition for defending it, &c.

With some battalions of riflemen *trained dogs* were of great use, because they gave warning if anybody came near to the camp from outside.

The *helmets* covered with brass and the *buttons* of the uniforms were betrayers in particular when the sun was shining.

The *loading* and *unloading* railway carriages with infantry, cavalry, and artillery were executed fast and quietly.

The *result* of the German manœuvres is this: Because the Commander-in-Chief cannot get quick and exact reports about the enemy, the *deployment* of the troops must be more slow and more cautious; but not this alone, also the *crisis* of the fight will be more remote than before, because the engagements begin at greater distances and the firing must have longer time to do its work. As so many new factors must be taken into consideration, the demands on every man of the army, from General to the last soldier, have grown immensely, and with them the responsibility. The *importance of the ground*, and the good or bad use made of it, can decide, in particular with impromptu fights, the fate of the day. Artillery and infantry must support each other more than ever, and the infantry cannot reap the laurels in a ranged battle *without being aided* by artillery. Attacks in front against an enemy who has not been weakened by our projectiles *cannot succeed*. The defender will take *greater* profit from the new powder and new rifle than the assailant. The interference of cavalry has been more *limited*, but is yet possible.

We conclude this article here, but suggest that now, more than ever, the result of the battles of the future depends on the SPIRITUAL and MORAL factors of the armies: the spiritual, as the claims to the character to self-dependence and to reflection have increased; the moral, because the terrors of the battle are no longer veiled in smoke, that intoxicated in some manner.

# THE ARMED STRENGTH OF RUSSIA.

By Major Otto Wachs.

(Translated from the German by Captain J. M. Grierson, R.A., D.A.A.G.)

The Far East of Europe, the Sarmatian Plain, is inhabited by about 100 millions of people known by the name of "Russians." Many nations, many tribes have been swallowed up in them, many disputed claims have been settled, and though language, customs, and ways of thought at first presented great points of difference, all those mighty factors finally struck into parallel paths, and the Scythian and Mongolian blood permeated throughout the nation. Only in the western border provinces do Finns, Germans, and Poles still hold their own, but that only with difficulty. The conformation of the country, which is nothing but an immense plain, has had great influence in the production of homogeneity throughout the population of this vast Empire, and the dominating race, whose home was originally in the angle between the Oka and Volga, is the Great Russian, a strong-boned people produced by the intermarriage of Turanians and Slavs.

"As the soil is, so is the heart of man," says Byron, and the continental Slav is like his birthplace. The soil is, however, not only an index to the heart of man, but, in a still higher degree, to his body and physical qualities, and the bitter endless fight against the hardships of life and against merciless Nature has given the Russian an iron temperament, and brought his bodily strength to its full development. But it is not only exterior causes which have been instrumental in producing this homogeneity of race; religion has also had a most powerful effect in this direction, and the great mass of the people (over 75 per cent.) is united in one faith under the greatest moral power in Russia, the Orthodox Church. This again is closely connected with Absolutism, that omnipotence of the Tsar which reduces everything below it to a dead level, and which has been imported from the East. As there is only one will of God, so there is only one power on earth, that of the Emperor.

In Russia, which is not only geographically the country where Europe merges into Asia, a constant struggle goes on between European culture and barbarism, European energy and Asiatic indolence, and European humanity and savage cruelty. The seeds scattered from the East and from the West have borne fruit, and have enabled the Russian people so to adapt what they have borrowed from others that these very opposite qualities are now looked upon as thoroughly Russian.

A hostile climate, niggard Nature, and the hard struggles of former years have certainly steeled the body of the Russian, but at the same time have imparted to his mind its characteristic feature, and the lesson which he carries through life, the idea that he is a *servant* in this world. The opposite influences which are brought to bear upon the people have caused curious contradictions in its character, and one observes how easily it is moved from apathy to energy, from mildness to anger, from slavish subjection to sudden revolt. Boldness in the sphere of the intellect and timidity in that of every-day life, foolhardiness and boundless self-confidence, caution and weak-minded pessimism, are all characteristics of the nation. Determination is united to recuperativeness, Slavonic expansiveness to firmness, hard-heartedness to good-nature, and mercilessness to kindness.

If to the above list of characteristics be added the powerful motors of religious, political, and national fanaticism, which permeate both individuals and the people at large, it will easily be recognized that colour and shading are not wanting in the teeming millions of Russia.

Let us now consider that child of the people, the *soldier*. The character and nature of his home can be read in his physiognomy, which at once attest his nationality. His eye, which is usually small, has been often compared to frozen water, on account of its dull, confused, and immovable appearance, and still sometimes a clear piercing glance flashes from it. His brow, which rises above a snub nose and prominent cheek-bones, is low, and the head is united to the body by a strong neck. His hair and beard are lustreless. In general he is not so tall as the German or Austrian soldier; the minimum height in Russia is fixed at 1·54 metres, and the average height of the recruits is 1·62 metres. The Esthonians, Lithuanians, and Caucasians are taller, and the Tartars and Poles shorter, than the other races of Russia. Of 879,000 men liable to service in the year 1885, 62,680 were rejected as being under height or for physical defects, and 72,021 had to be put back for another year, among them 67,156 for imperfect development. In 1889, the number of recruits placed in the ranks was about 250,000. According to the recruiting statistics of 1888, 852,823 men became liable to service. Of these, no fewer than 406,092 were wholly or partially freed from actual service under the military law of exemptions, 247,450 were taken for the Army and 1,495 for the Reserve troops, and 19,807 failed to appear. Of the 27,032 men liable to service in the Caucasus, Kuban, and Terek districts, only 2,398 were actually placed in the ranks.

As regards the individual soldier, however, the recruit who eventually joins the colours is a type of cold-bloodedness, dumb obedience, and obtuseness. No weather, no climate causes him to break down. He fears neither glowing heat nor piercing cold; he defies bad feeding and clothing for a long time; he bears with equanimity continued hardships and extraordinary privations.

It was armies of such material which inflicted the first check upon the great Corsican, stormed the natural fortresses of the Caucasus and conquered Schamyl, and, by the overthrow of Khiva and the taming of the wild Tekke Turkumans, made the Tsar sovereign of the Central Asian salt steppes, and opened the way to Hindustan. Nothing shows more clearly the enormous power of endurance of the Russian soldier than the first and unsuccessful expedition against the Turkumans. From Tchikishliar, on the eastern shore of the Caspian, the troops had to wade through glowing hot sand-drifts, which were only here and there interrupted by narrow bands of hard and dry clayey soil full of deep rifts. This country had to be crossed by the expedition at a temperature of more than 40° R., while particles of irritating salt sand found their way into every pore of the bodies of men and animals, and the only water was a bitter evil-smelling liquid of a temperature not under 20° R. Countless swarms of flies and midges settled on all living bodies when not in motion, and made real rest impossible. The number of sick from sunstroke, dysentery, eye-diseases, scurvy, &c., rose to over 26 per cent. Still no complaints were made, and no murmurings arose against the strokes of misfortune, but all bowed to the decrees of Providence with heroic resignation and self-denial.

But enough of proofs that there are no obstacles of country or of climate which a Russian General cannot confidently expect to overcome at the head of troops, for whom toils, sacrifices, or dangers have no terrors. The Russian will bivouac in snow and ice without a fire, and can take rest on the glowing sand-desert where not a tree gives shade, and these iron heads and iron hands obey with Russian obedience. In the Eastern Empire of the Slavs, obedience

is quite a different thing from the same quality in other European armies. There, in the strictness of the discipline observed, there is not a trace of an attempt to appeal to the imagination, nor is there, on the other hand, any inward desire to rebel against the necessity of the will being subjected to military discipline; obedience is part of the nature of a Russian. It is a consequence of serfdom, and although this now belongs to the past, its consequences remain, and to get rid of them will take more than a generation.

It is, therefore, not necessary to suppress the individual aspirations of the recruit placed in the ranks by a system of formalism, nor to check rebellion by military discipline. The death of his individual will, leaving nothing but obedience behind it, does not take place when he joins the colours; he is born without a will, and imbued with dumb submission. In the Muscovite Empire we find obedience as a born and instinctive quality, and there is no struggle between the free will and implicit subjection to discipline. As a stone continues in the course in which it is thrown, so the Russian obeys an order. His obedience is truly fanatical, and arises from the necessity he feels for being commanded.

The soldier is thus amenable to discipline, because he looks upon his Officers as infallible, and as placed over him by Providence. He rests, stands, marches, lives, and dies, by order of his superiors, and—wonderful, but true—the Oriental knout, and the Western corporal's stick, have succeeded in imbuing him with a species of self-reliance which, as will be seen later on, when we come to consider tactics, really does exist to a certain extent.

Another means of teaching the soldier obedience is, as we have already seen, religion, the faith of the masses. It is easy to understand how in Russia, where the religious tendency and the feeling of dependence and timidity keep the mind in thraldom, it is no difficult matter to make every war into a religious struggle, and to strengthen patriotism by piety. Under those circumstances, religion can be used for purposes to which it is not applicable in Western countries, and, as formerly the wars with the Osmanli in the south became a sort of crusade, so, possibly, in future, a war in the West may, in the same manner, be elevated into a religious struggle. A race struggle would soon become a contest for the faith with this stern and merciless, but badly developed people, and *vice versâ*. Since the Emperor Nicholas clothed his lust of conquest with the words that the Greek Church, the only true one in Christendom, had the mission and the duty of bringing new life into the heretical West, the Russian Church, which since the 7th century has been lying dormant, has roused itself out of its traditional lethargy, has made itself subservient to worldly purposes, and is now precipitating itself into struggles which lie outside of its sphere of action. Thus religion, that strength which is essentially the most ideal, and which should raise war above the level of mere butchery, reaches out its hand to brute force, not to tame and elevate it, but rather to intensify it, and to introduce new elements of destruction into it. Fearing the advance of knowledge, the Russian Church, once so passive but now become militant, has cut itself off from the West, and now calls out to its people to war on Europe.

But this obedience conceals a weakness and a danger in itself. As human nature is lost sight of in the soldier, the man becomes an instrument, without a will, in the hands of others—a thing, a machine. Blindly following the directions of his leaders, he becomes incapable of thinking for himself, and although implicit execution of orders is a fine thing, it is fine only when it is intelligent. In this more than blind Russian obedience, there is no trace of intelligent utilization of human power and of circumstances, nothing but the effect of pure external activity, for the power which produces such obedience is not a moral force, and dies away as soon as the exterior pres-

sure is removed. The pressure is exercised through the fear of punishment, and duty and honour are factors which are not the main ones. Peter I possessed this power; astonished, the Russian people, which he forced to move forward, recognized his iron will and unbending strength, and named him—the Great.

Still worse than this weakness, however, is the danger of abasement brought on by this obedience. It gives rise to abjectness, and thus the moral atmosphere becomes tainted. Where silence and obedience are the first laws, where talking is treason, and where thinking is open mutiny, men take refuge in cunning and deceit, and correspondingly lose their sense of honesty, their trustworthiness, and their soldierlike faithfulness. As their mental power is confined and undermined, so their power of acting and thinking independently suffers. No one can imagine how far matters will go when Nihilism penetrates to the mass of the people, and, therefore, of the rank and file, which have hitherto remained untainted. Before it even the strength of religious belief will prove of no avail.

The consideration of the Russian soldier naturally leads to that of his Officer, the backbone of every army, and as an army can but be judged by the spirit prevailing amongst the Officers, we shall attempt in the following pages to sketch their social, military, and political positions.

We are first met by the division into the three categories—the Guards, the Line (usually called the Army), and the irregular troops. If we also consider the various elements of which the body of Officers is composed—high aristocracy, lower aristocracy, official aristocracy, Poles, Finns, Germans from the Baltic provinces, and various persons of Asiatic extraction, such as Caucasians, Tartars, Kirghiz, Turkumans, and others, it is evident that there can be no talk of a homogeneous body of Officers, and that, where education and origin are so different, the ideas of the honour of the profession cannot be highly developed and concentrated.

It is not the intellectual and moral aristocracy of the nation, but rather the aristocracy of wealth, even more than that of birth, which furnishes Officers for the Guards, who occupy, or until lately occupied, the best garrisons. The Line Officers, who are badly paid, just as the Russian soldier is poorly paid and clothed, are inferior to those of the Guards in birth, education, and private means, and lead a monotonous and hard life in wretched garrison towns. The Officers of the Asiatic irregular troops are nothing more than chiefs of wild hordes of horsemen, and are, from a military point of view, as incompetent as the Officers of the Militia.[1]

Even more than in material affairs there are wide differences in scientific education and mental attainments to be noticed, all the more so as the Slav has usually a decided repugnance to hard continuous work of any description. To this rule the German, Polish, and Finnish elements form a remarkable exception. In the higher ranks, the technical troops, and in the General Staff, intelligence and a striving after knowledge may be remarked; but as the General Staff Officers have usually lost all touch with the troops, and are often employed in parts which have no connection with the Army, there is no bond between theory and practice, and though experience may be added to knowledge, the result does not produce really practical Officers. Besides, knowledge is not education; education alone, and not knowledge, makes the intellect strong and independent.

In the matter of promotion the Guards are, in spite of recent regulations, much better off than the Line, although the path to the highest ranks, which were formerly closed to them, has been thrown open to the latter.

Let us now examine the state in Russia of that bond which holds a corps

[1] I presume the author means the Russian Militia.—J. M. G.

of Officers together, and which is called comradeship. Here we at once touch a weak point, for not only are the Officers of the larger units split up into sections by national and social differences, but the same may be said of regiments, even of those of the Guard. If there is no comradeship among the Officers of those "crack corps," it may be imagined how little of this feeling there is in the Line, and still more in the irregular troops. Besides social reasons, there are other causes which materially tend to produce this state of affairs, the chief of which is the want of strength to resist pernicious political influences, which have brought about that the mass of the Russian Officers forms a body without any cohesion or firmness of character. It is a body without a common soul, and in their comfortable *laissez-aller*, so utterly unknown among us, the individual members of this body often possess an astounding degree of amiable freedom from restraint, while at the same time they surround themselves with an iron barrier of reticence, caused by suspicion of others.

It is unfortunately a sad fact that in the Russian Army, as in the Russian Administration, where principles come little into play, and personalities, therefore, occupy prominent positions, men of firm and upright character are not so much valued as pliable persons without principles, who are ready at any moment to change their opinions or to acquiesce in things as they are, and who, in evil days, with low cunning reserve themselves for better times, fall down in admiration before unimportant superiors, and willingly consider themselves as the mouthpieces of a higher will. It would be doing too much honour to such self-seeking conduct to look for cleverness in it when those who practise it are only guided by considerations of expediency.

Under such circumstances it is not to be wondered at that the character suffers and is reduced to a dead level of mediocrity. Men of exceptional talents disappear in the great mass and become as the others; all individuality ceases, because the fact is lost sight of that in this life there are forces which cannot be understood except by intellects of high quality. How can comradeships flourish in a body of men who hate their fellows, not for their faults, but for their superior qualities? Can it be expected that such a body can be filled by *men*, where no one can protect himself against abominable secret cabals, where an Officer of high spirit and noble ideas cannot properly guard the lives and honour of himself and his family, where the privilege of being an Officer is a hollow mockery, where frivolous arrogance reigns supreme, and where not the proper person for an office, but the proper office for the person, is the first consideration? When justice stands at the mercy of caprice everything becomes unsettled, the source of order dries up and with it the first condition of moral development, and danger threatens the body of Officers. In times of trouble there will be no want of sad experience of the breaking down of persons who have only been accustomed to act upon orders, as soon as those orders are no longer given, for in critical situations empty forms and routine will never suffice if the whole course of training, instead of rearing men of character as supports of throne and fatherland, has tended to erase all peculiarities, put fetters on the will, and lull the conscience into somnolence.

For Western European ideas, the most surprising feature in this corps of Officers is the prevalence of various political ideas amongst it. These have not only impregnated the minds of the Officers, but have had the effect of still further splitting up that body as, fearing secret denunciations, each one keeps silence, lives in fear, and can no longer enjoy his harmless existence; even the bonds of old friendship are loosened by them. Politics tear asunder the moral bonds which should unite the Officers into a whole. Unfortunately it has been proved how Nihilism has drawn the most gifted sons of Russia into constant attempts at taking the law into their own hands, and

into the most desperate adventures, so that, in the most shameless manner and in secret. Officers, who first of all should be defenders of the throne and representatives of the principles of law and order, have incited their subordinates to mutiny or have themselves committed deeds which justly place them in the category of murderers.

In the very land which under Nicholas was considered as the bulwark of Conservatism, and which seemed to be able to guarantee for ever the stability of the Eastern world combined with natural subjection to the powers that be, this spectre of Nihilism has risen suddenly and with terrifying violence. A few words as to it may here be in place.

Russia's wars in the west and south made her Officers and men acquainted with things and opinions, the memory of which they did not leave behind them on their return, but which rather propagated themselves throughout the country, which at that time was in a state of terrible backwardness. The ideas of Western European peoples were scattered broadcast over the plains of Russia without there being anyone to interpret them. They, therefore, remained imperfectly understood, but were, perhaps, for that very reason all the more eagerly taken up, and developed to an unlimited extent. Everywhere this Nihilism challenges the spirit of subjection and reverence, and opposes the most audacious intellectual and moral cynicism to the simple, political, and religious veneration which prevails in the Muscovite State. Alongside of orthodox blindness, there are many fanatical sects, freethinkers, &c., who encourage Nihilism, who carry the words "murder and dynamite" on their banners, and who stretch out their hands for explosive shells. The idea of boundless autocracy crushes some into the dust, while others hate and curse every kind of authority. All run to extremes, some in faith, others in atheism, some in love, others in hatred, some in the deepest subjection, others in open mutiny; some give the last drop of their blood for the almighty Tsar, others take his life. The revolutionary spirit works on the same lines as the religious spirit, and the denial of everything has taken the same form and character as the Confession of Faith. In its passionate devotion to an idea, Nihilism has raised itself to a sort of religion whose God is the people, the secret and hitherto concealed power of which is worshipped, and whose law is unquenchable hatred to the ruling house. The Russian Officers are also thoroughly imbued with this spirit of mutiny, and for many of them, whom neither need nor disgust at the existing state of things drive into the arms of Nihilism, "Holy Russia" occupies a far higher position than the "Mighty Tsar." Formerly it was impossible, but now one can ask the Russian Officer, "Who are thy gods? Art thou a servant of Cæsar, to whom thou has sworn fidelity, or art thou with the masses?" Formerly absolute devotion to the reigning house was the noblest and most characteristic feature of the Russian Officer, now this feeling is by no means to be presupposed in him. If this spirit of faithlesness makes further progress, the corps of Officers, and with it the Army, will lose enormously in value, because, with the loss of the spirit of fidelity, the consciousness of the holy mission of the Army, and the power and will to sacrifice all the good things of this life, and even life itself, for Tsar and Fatherland will also disappear. An Army which has lost the power of properly appreciating its mission is deprived of the main factors which should be constantly at work to infuse life into the whole, namely, military spirit and military honour, and must eventually fall to pieces, involving in its ruin the ruin of the people.

It is not our intention to name here even the most prominent Officers, some of them members of the highest families, who have become involved in Nihilist conspiracies; two names will suffice—Sukhanoff and Mohrenschield. The fate of the first was tragic; there was no justification for his deeds, but his fate wrung compassion even from his judges, as from

the proceedings of the trial it was evident that this Officer had entered upon the path of crime because he was prosecuted and calumniated on account of his bold exposure of the corruption of his superiors. In his despair, Sukhanoff threw himself into the open arms of Nihilism, and travelled rapidly down its slippery path until he found himself a prisoner at the bar, and then in front of the muzzles of the rifles of his comrades.

Colonel von Mohrenschield, Ataman of the Orenburg Cossacks, Knight of the St. Anne's Order of the 2nd and 3rd Classes, of the St. Stanislaus Order of the 2nd Class with swords, of the St. Vladimir Order of the 3rd and 4th Classes, of the Persian Order of the Lion and Sun of the 3rd Class, possessor of a gilt sword with the inscription "For Valour" and of the medals for the Campaigns of 1853, 1856, 1863–64, 1875–76 (Khiva and Khokand), 1877–78, and 1881 (Central Asia), was deprived by sentence of the Orenburg Court-Martial, in October, 1889, of all his offices, rank, orders, titles, and rights, for having taken part in a secret military agitation against the Government of the Emperor Alexander III, and condemned to banishment for life to the Government of Olonets. The number of Officers who, from false enthusiasm for ideas of freedom, devote themselves to death or banishment does not seem to be diminishing. These are proceedings which enable us to understand what slaves are who break their chains, and also the meaning of the curse of being only a machine, for "all slaves are faithless, only free men are true." Do not let us be misunderstood. We are not talking of individual freedom, however great and important this latter is; military obedience is the reconciliation of this freedom with comradeship.

From the above, a conclusion can be drawn as to the state of the discipline of the leaders. Five ukazes of the present Tsar, one after another, were impotent to make subordinates salute their superiors when not on duty; to quote only one instance. The insubordination of the higher Officers is, indeed, a bad example. How can one characterize the conduct of the "political" Generals? Although Generals played a leading part in the conspiracy of the Strieltsi against Peter I, and at the accessions of the Emperors Alexander I and Nicholas, men like Tchernyayeff and Skobeleff, who sought to influence the policy of the Empire, were formerly unknown. Skobeleff had neither earnestness of character nor nobleness of soul, was characterized by Todleben as a man "*sans foi ni loi*," and was only kept quiet with difficulty by Alexander III. In 1888, General Ignatieff, in spite of the orders of Government, caused a Church festival to be turned into a political demonstration. In August, 1889, the General Commanding at Kishinev, in proposing a toast, said that he was longing for the day when the hoofs of Cossack horses would make German soil tremble. Certainly the "Nord" remarked that it was 100 to 1 that the report of the speech was a pure invention, as Russian Generals had too strong a feeling of discipline (?) to let such expressions escape from them, but here the "Nord" is wrong, for we could name several others who have similarly committed such breaches of discipline.

If we now for a moment consider the Russian *Intendance*, we at once come upon the sphere in which the reforms instituted by the Tsar have as yet had the least success. Nurse "Custom" has here been especially careful in keeping alive the habits of administrative corruption, bribery, deceit, and the Russian national vice of drunkenness. According to Asiatic ideas of serving the State, the official fills his own pocket at every possible opportunity, and the vast gulf between the maxims of the Government and the conduct of its officials, between theory and practice, remains unbridged. Corruption always flourishes, and with it the canker-worm which hinders the development of the Empire. Proofs can be given of attainments, but

not of conscientiousness, and the latter is a tender plant which does not flourish on Russian soil.

It has always been in a less degree the battlefield than the hospitals and hunger which have destroyed Muscovite armies. Of the 100,000 men with whom Kutusoff began his pursuit of Napoleon, in 1812, more than 48,000 were in hospital at the beginning of December. In the middle of this month, of 200,000 Russians who had been gathered together, not more than 40,000 were with the colours. And as in the Crimean War, which cost Russia half a million fighting men, so also in the last Russo-Turkish war was there no want of proofs of the undisturbed continuance of this mortal disease which is gnawing at the vitals of Russia, for, according to Knorr ("The Russian Medical Department in 1877–78"), this war cost 118,000 dead and 31,000 invalids, or 149,000 men in all. Russia put 934,000 men in the field in Europe and Asia, and the losses therefore amount to almost 16 per cent. of the mobilized troops. To these must be added the enormous but uncounted numbers of those who became unfit for service on account of the hardships they had undergone; the mortality among whom must also have been terribly great. This is not the place to enter into details of the frauds committed by the Army Contractors, through whose hands millions and millions of money passed in 1877–78, nor to speak of the barrels in the artillery depôts which were supposed to contain powder, but in reality were filled with sand, nor of the corn sacks weighted with lime. Farther on, figures will be given to show the difference between the actual and the nominal strength of the Army. We shall now proceed to give a few data as to the supposed numbers of the Army, including also the troops recruited from and stationed in Asia.

It was in general in the year 1874 that universal military service was first applied in Russia, although this measure was only extended to Finland in 1881, and to the Caucasus in 1886. Liability to service begins with the 21st year of age and lasts for eighteen years in the standing Army (five with the colours and thirteen in the reserve). Till the close of his 43rd year of age a Russian is bound to serve in the Militia (Opoltchenie), which was organized in 1876 and which comprises two bans.

The following tabular statements[1] of peace and war strengths of the Russian Army are taken from the "Almanach de Gotha" for 1890, and correspond very nearly with those given in the volume of Löbell's "Jahresberichte" which appeared in June, 1890.

PEACE STRENGTH IN 1889.

(a.) *Field Troops.*

| | Combatants. |
|---|---|
| General Staff | 1,920 |
| Instructional troops | 865 |
| 192 infantry regiments (12 guard, 16 grenadier, and 164 army regiments) of 4 companies and a non-combatant company = 768 battalions of 4 companies, or 348,864 men. | |
| 20 rifle regiments of 2 battalions of 4 companies = 17,920 men. | |
| 42 rifle battalions (4 Guard, 8 Finnish, 8 Caucasian, 4 Turkestan, 8 Trans-Caspian, 10 East Siberian) of 4 companies = 19,528 men. | |
| 848 battalions of infantry | 386,312 |

[1] Too much reliance should not be placed on these figures; there are many errors of detail.—J. M. G.

| | Combatants. |
|---|---|
| 56 cavalry regiments (4 guard cuirassier, 2 guard lancer, 2 guard hussar, 2 guard dragoon, of 4 squadrons, and 46 army dragoon of 6 squadrons). | |
| 56 depôt cavalry cadres (10 guard, 42 army, and 4 Caucasian of 100 combatants and 100 horses). | |
| 328 squadrons of cavalry | 57,416 |
| 51½ field artillery brigades (3 guard, 4 grenadier, and 41 army, of 6 field batteries, 1 East Siberian, and 1 West Siberian, of 4 batteries, 1 Turkestan of 7 batteries, and 3 mountain batteries), in all 98 heavy, 185 light, and 23 mountain batteries = 306 batteries (276 of 4 and 30 of 8 guns), with 1,344 guns and 55,753 men. | |
| 5 sortie batteries, with 10, and 2 depôt batteries with 6 guns, together 795 men. | |
| 30 horse batteries (5 guard, 23 army, 1 Turkestan, and 1 West Siberian), with 182 guns and 5,332 men. | |
| 343 batteries field, home, and mountain artillery, with 1,536 guns | 61,880 |
| 17 sapper battalions (1 guard, 1 grenadier, 13 army, and 2 Caucasian) of 5 companies. | |
| 5 sapper companies (1 Turkestan half-battalion of 2 companies, 1 Trans-Caspian, 1 East Siberian, and 1 West Siberian company). | |
| 8 pontoon battalions (of 2 companies, with a pontoon train of 102 wagons). | |
| 6 railway battalions (2 of them Trans-Caspian) of 4 companies. | |
| 4 railway cadre companies. | |
| 4 submarine mining companies. | |
| 6 engineer and 17 telegraph parks. | |
| 33¼ battalions of engineers with trains and 23 parks | 18,977 |
| 5 train cadre battalions (4 of 4 companies, 1 of 3 companies) = 18,630 combatants. | |
| 48 flying artillery parks (3 guard, 4 grenadier, and 41 army) of 4 sections. | |
| 15 mobile artillery park cadres of 4 sections. | |
| 3 artillery siege parks (2 in Europe of 424, and 1 in the Caucasus of 320 guns), each of 4 sections. | |
| 6 field engineer parks of 2 sections of 5 divisions, hospital corps, 4 disciplinary battalions, and 2 military prisoner sections. | |
| Total trains, &c. | 35,130 |
| Total field troops | 562,500 |

(b.) *Reserve Troops.*

| | |
|---|---|
| 9 infantry regiments (3 army and 6 Caucasian) of 2 battalions = 9,000 men. | |
| 107 reserve cadre battalions (1 guard, 99 army, and 7 Siberian) of 5 companies of 100 men = 53,500 men. | |
| 12 Caucasian reserve cadre battalions (4 of 6, 2 of 5, and 6 of 4 companies) = 5,800 men. | |
| 136⅔ battalions reserve infantry | 68,300 |
| 5 reserve artillery brigades = 30 batteries (2 heavy, 20 light, 5 mixed light and horse) with 98 guns | 4,334 |
| Total reserve troops | 72,634 |

(c.) *Local Troops.*

| | Combatants. |
|---|---|
| 33 line battalions (20 Turkestan, 8 West Siberian, 5 East Siberian) of 5 companies = 19,780 men. | |
| 7 Caucasian battalions and 187 detachments = 12,690 men. | |
| 1 company of Crimean Tartar rifles, 1 Gurian, and 1 Grusian Drujina of 4 sotnias, and 2 sotnias at Batum = 1,420 men. | |
| 42 battalions of infantry | 33,890 |
| Cavalry: 1 division (2 squadrons) of Crimean Tartars, 1 Daghestan cavalry regiment of 6 sotnias, 1 Irkutsk sotnia, 1 Krasnoyarsk sotnia, 2 Ussuri sotnias, 1 Kuban sotnia, 9 Terek sotnias, 2 Daghestan sotnias, 3 Kars sotnias, 1 Batum sotnia, 1 sotnia of Turkuman militia, 1 sotnia of Sukhum militia, and 6 gendarmerie cadre detachments. | |
| 31 squadrons and 6 detachments of cavalry | 4,350 |
| 50 fortress artillery battalions (2 of 5, 48 of 4 companies). | |
| 7 independent companies and 2 detachments fortress artillery. | |
| 51 battalions and 2 detachments fortress artillery | 25,310 |
| 565 escort detachments (for police work and the escorting of prisoners) = 11,500 men. | |
| 21 brigades of frontier guards (18 on the western frontier, 3 in the Caucasus of 1,300 dismounted and 500 mounted men) = 37,800. | |
| 137 local detachments (14 in European Russia, 52 in the Caucasus, 7 in Trans-Caspia, 64 in Siberia = (?). | |
| Various local troops | 49,300 |
| Total of local troops | 112,850 |

(d.) *Cossacks.*

| | |
|---|---|
| 110 squadrons Don Cossacks (2 guard regiments of 4, and 17 regiments of 6 squadrons), with 8 horse batteries of 6 guns, and 1 depôt battery of 3 guns = 17,792 men. | |
| 69 squadrons Kuban Cossacks (1 guard squadron, 1 division of 2 squadrons, and 11 regiments of 6 squadrons), with 5 horse batteries of 4 guns = 11,535 men. | |
| 4 Kuban Cossack foot battalions of 4 sotnias and 10 cadres of 22 men each = 2,040 men. | |
| 23 squadrons Terek Cossacks (1 guard squadron and 4 regiments of 4 squadrons), with 2 horse batteries of 4 guns = 3,759 men. | |
| 1 regiment Astrakhan Cossacks (4 squadrons) = 602 men. | |
| 33 squadrons Orenburg Cossacks (6 regiments of 5 squadrons and 3 independent squadrons), with 3 horse batteries (14 guns) = 6,232 men. | |
| 19 squadrons Ural Cossacks (1 guard squadron, 1 instructional squadron, and 3 regiments of 5 squadrons = 2,808 men. | |
| 3 Siberian regiments of 6 squadrons = 2,697 men. | |
| 1 Semirietchie regiment of 4 squadrons = 650 men. | |
| 1 Trans-Baikal regiment of 6 squadrons, with 2 horse batteries of 4 guns = 1,983 men. | |
| 2 Trans-Baikal foot battalions of 5 companies = 1,200 men. | |
| 1 Amur regiment of 2 squadrons, and 1 foot battalion of 2 sotnias = 655 men. | |
| 228 squadrons, 20 foot sotnias, and 20 horse batteries with 98 guns | 51,944 |
| Total peace strength in 1889 | 799,928 |

PROBABLE WAR STRENGTH IN 1890.

| | Combatants. | Horses. | Guns. |
|---|---|---|---|
| (a.) *Field Troops.* | | | |
| Staff | 3,500 | 1,500 | — |
| 848 battalions of infantry and rifles | 785,164 | 40,000 | — |
| 328 squadrons of cavalry | 49,792 | 51,344 | — |
| 358 batteries field artillery | 75,760 | 57,056 | 2,864 |
| 33½ battalions engineers, with 8 trains and 23 parks | 30,244 | 9,500 | — |
| Trains, &c. | 50,000 | 80,000 | 1,166 |
| 881 battalions, 328 squadrons, 358 batteries | 994,460 | 239,400 | 4,030 |
| (b.) *Reserve Troops.* | | | |
| 128 reserve infantry regiments of 2 battalions | 256,000 | 15,360 | — |
| 20 reserve artillery brigades (of 3 light and 1 heavy batteries) | 18,310 | 14,050 | 640 |
| 34 reserve sapper companies | 6,500 | 650 | — |
| 264⅓ battalions and 80 batteries | 280,810 | 30,060 | 640 |
| (c.) *Cossack Troops.* | | | |
| 330 squadrons and 23 horse batteries, Don | 50,500 | 56,035 | 140 |
| 191 squadrons and 5 horse batteries, Kuban | 27,170 | 29,940 | 30 |
| 32 foot sotnias, Kuban | 6,000 | 480 | — |
| 56 squadrons and 2 horse batteries, Terek | 9,378 | 8,323 | 10 |
| 12 squadrons, Astrakhan | 1,623 | 1,790 | — |
| 111 squadrons and 7 horse batteries, Orenburg | 16,800 | 18,629 | 40 |
| 48 squadrons, Ural | 6,528 | 7,160 | — |
| 54 squadrons, Siberian | 7,344 | 8,055 | — |
| 12 squadrons, Semirietchie | 1,632 | 1,790 | — |
| 18 squadrons and 3 horse batteries, Trans-Baikal | 3,180 | 3,573 | 20 |
| 30 foot sotnias, Trans-Baikal | 5,625 | 450 | — |
| 6 squadrons, Amur | 816 | 895 | — |
| 6 foot sotnias, Amur | 1,125 | 90 | — |
| 758 squadrons, 68 foot sotnias, 50 horse batteries | 137,730 | 137,210 | 240 |
| (d.) *Depôt Troops.* | | | |
| 199 depôt infantry battalions (13 guard, 16 grenadier, 169 army, and 1 Caucasian) | 160,000 | — | — |
| 112 depôt squadrons | 16,000 | 16,000 | — |
| 5 field artillery depôt brigades (48 batteries) | 10,500 | 7,500 | 384 |
| 5 depôt sapper battalions (4 army and 1 Caucasian) | 3,000 | 80 | — |
| 204 battalions, 112 squadrons, 48 batteries | 189,500 | 23,580 | 384 |
| (e.) *Local Troops.* | | | |
| | 112,850 | 15,500 | — |
| Total war strength | 1,715,350 | 445,750 | 5,290 |

On account of the constant changes in formation and strength which take place, the above figures can only be considered approximately correct.

The militia comprises 160 battalions of infantry, but as the number of men in this category would permit of a much larger number of units being formed, the four youngest classes would be called upon to fill up the field or reserve troops. According to the Imperial Order of 31st January, 1890, published in the "Russian Invalid," cadres have been established for the militia of 2 men for each company, battery, or squadron to be formed on mobilization. These are placed under the Circle Commandants, and in peace take charge of the stores of the various units, and instruct their men when called up for training.

According to the statements made by the War Minister in the German Reichstag, in June, 1890, Russia had at her disposal in 1889, including the militia, more than 2,579,000 men.

A few remarks explanatory of the above figures are necessary. As far as concerns men and horses, Russia has no cause to fear the exhaustion of her resources, even after years of war, for, as we have already seen, the great Russian family is extremely prolific, and the Empire is enormously rich in horses; while Germany and Austria together only possess 7,500,000 horses, Russia has 20,000,000, although, in consequence of carelessness in breeding, which perhaps arises from the change in the manner of life of the Cossacks, the Russian horses have lately fallen off in quality. The average length of service of the horses in the Army is ten years. The physical resources of the Empire, therefore, seem inexhaustible, and the armed strength, as it stands upon paper, something colossal. In Russia, where material strength is everything, these figures impose upon people and awaken a feeling of superiority over, we might almost say, all the rest of Europe. We, however, who do not invariably recognize power in numbers, or greatness in strength, but are given to proving figures, are not of this opinion, and arrive at quite another result, even if this huge force were not known to exist on paper only. It is a matter of experience that at no time has the real strength of the Russian Army been equal to the nominal strength, that Russia has never been able to mobilize the whole of her forces, or put forth all her strength in war, and that therefore, at the end of even victorious, though bloody, wars, she has never been able to follow up her success energetically. These features have repeated themselves again and again ever since the days of Narva. Even in the 19th century, in the Napoleonic wars, in the first Turkish war, in the first Polish revolution, in the Crimean war, and in the last Turkish war, the mobilized forces in the first half of the campaign never reached a tenth, in the second half never a quarter, of the supposed total war strength. And what an enormous time was spent in the cumbrous concentration of the units of these armies! Russia required ten full months to put down the Polish revolution of 1831 and to concentrate on the Polish theatre of war 200,000 of the 629,000 men who were then supposed to form the fighting strength of the country. How long did it take, after the declaration of war in 1877, to place a Russian army across the Danube in a position to begin the long-dreamt-of march on Constantinople, which was to lead to such a difficult and sanguinary campaign? At that time the fighting strength of Russia was on paper put down at 1,555,000 men; the highest figure, however, attained by the troops employed in the Balkan Peninsula, including those on the lines of communication, those in the fortresses, the sick, and the wounded, was only 464,500 men. What was most severely felt was the want of a regular and properly organized supply of reinforcements to fill up the gaps in the ranks, and secure and hold what had been won. The Army was placed in the field as in a war-game, or as if by chance, without considering that war is a permanent putting forth of strength, and now is, and must be,

a living movement of the nation. Field-Marshal Moltke says of the much-belauded campaign of 1828–29, in Turkey: "Diebitsch arrived before Adrianople with the shadow of an army, but with the prestige of invincibility." This General brought no fewer than 18,000 invalided soldiers with him to Adrianople, where he, to deceive spies, had to make the shattered regiments march two or three times through the town in different directions and with different uniforms. It was not alone wise moderation, it was inability, which prevented him from advancing on Constantinople at the head of the half-starving remnants of his army. It had left Russia 100,000 strong, and only 10,000 to 15,000 of these men saw their homes again.

Things are otherwise now. The new organization of the Russian Army gives proof of a great development of strength, and has many good points, but there is no homogeneity in it, but, on the contrary, much that is weak, and little uniformity. It is the veritable expression of the political circumstances prevailing in the Muscovite State. Even if the Army actually reached the strength attributed to it, and although, with its well-known endurance and bravery, it would certainly, in a campaign, especially on the defensive, do great things, we still hold it to be unable to carry out a successful offensive campaign, on a large scale, against a strong European nation, superior to it in morale. For the huge but unintelligent Russian masses would not be able, by mere weight and numerical superiority, to crush a nation full of life and energy. History is full of proofs of this; the tide of invasion of the Huns was stemmed on the Katalaunian fields, that of the Mongols at Liegnitz.

To arrive, however, at an idea of the importance of the Russian Empire as a fighting power, it is not sufficient to be acquainted with the character of its people, and the numerical strength, organization, and equipment of its Army; one must also consider the administrative arrangements, the productions of the country, and its politico-economical and financial situation, all of which considerably affect the fighting power and must be in a sound condition to back up the exertions of the Army and afford it assistance. A year ago a French writer, trying to curry favour with the Russians, informed his credulous readers that 18 million combatants were ready to obey the orders of the Tsar. We may, however, comfort ourselves with the idea that such a display of force, either in peace or war, is impossible, without a sound system of political economy to back it up, for, as L. von Stern, that first authority on finance, says, the finances limit the effort that can be made. The Russian finances, however, are not in a condition to sustain any prolonged effort, and everybody who has closely followed Russian finance knows that in this respect the country is by no means prepared to enter upon military operations on a large scale, which are meant to be carried out to the bitter end; it is dangerous to enter even upon a popular war with disordered finances.

If we then sift the bare figures which represent Russia's fighting power, and prove and test them as to their real importance, it appears to us that the development of Russia's military power, beyond her own frontiers, depends upon so many conditions and chances that it is only really formidable if her opponent is timidly or unskilfully led.

Before we close this paper, we must pass shortly in review the various arms of the service, and we begin with that which is termed the "Queen of Battles." Of the Russian infantry it must be said that, with its proved bravery, its rugged endurance, and its great marching power, it is equal to the most severe tasks that can be imposed upon it, as long as the severity only lies in danger; in this case it does not understand the word "impossible." It is no more a smart body of troops on parade, as it was under Nicholas I, because in the interest of the education and instruction of the

whole, the instruction of the individual man in detail has been neglected, and Frederick the Great's words: "Soignez ces détails, ils ne sont pas sans gloire," have not been taken to heart. Although the system of instruction in field duties is beset by a host of forms, both it and musketry instruction, which is much facilitated by the steady temperament of the men, have given good results. The instruction given is in general sufficient, but more attention is paid to imparting mere military knowledge than to developing the intelligence.

The cavalry, which is certainly the most numerous in Europe, though it is assuredly not "numberless," was lately, with the exception of that of the Guard, turned into dragoons, *i.e.*, into mounted infantry, the rifle having carried the day against the sword, and has yet to prove its efficiency in war. In any case the old saying, "Tell me what sort of horses you will give me, and I will tell you what kind of cavalry I can form," has lost its value. According to our ideas, too little importance is attached to riding and too much to fighting on foot, musketry, and distance rides, and this must lead to the loss of that old heirloom of the cavalry, its spirit of dashing bravery. The Regulations lay more weight on the attack being determined than on its being impetuous. This creation of an unit cavalry has, however, the not inconsiderable advantages of uniformity in armament and training, and of greater facilities for filling up losses in war. Moreover, their training in fighting on foot enables the dragoons to be used not only when, for example, it is desired to disturb mobilization in hostile territory, and accordingly overrun a large tract of country, but also when it is necessary to hold certain points for a time.

In speaking of the Russian cavalry, mention must be made of the Cossacks. These darling children of Russian vanity, who from time immemorial have led a free, bold, and unrestrained life, full of hardships and privations, and varied by adventures on land and sea, and who, according to Clausewitz, are at one moment unspeakably brave and the next unspeakably cowardly, can still, although they now comprise all three arms, and have a totally different system of instruction from formerly, be, with justice, termed irregular troops. Formerly, as born horsemen, they did good work on outpost and reconnaissance duty, and in—plundering.

In general, history has not many remarkable deeds of the Russian cavalry to chronicle.

The artillery is well trained, but, with the exception of the horse artillery, is slow and cumbrous. Recently, field firing has been carried out in conjunction with infantry and cavalry, a very good practice, in which the Russians have shown the way to other nations. Now that Russia has realized the importance of artillery in the battles of the future, vigorous measures have been taken to increase its fighting value.

Let us now follow the sons of this country to the battlefield, on which the fate of States and nations is decided. We must confess that we envy Russia her fighting material, for neither migrations of tribes nor changes of fortune have had any influence upon it, but it has retained the same degree of courage and contempt of death which made the Slavonic warriors of Sviatoslav, in the wars in the 10th century against Byzantium, proverbial. The dark, heavy, and peculiarly rigid masses deploy with the quiet and regularity of a gigantic piece of machinery, and almost as if on parade. The Russian columns stand alongside and in rear of one another with sharply defined angles, like blocks of stone. With steady ranks, full of men who defy death, the tactical units carry out their movements on the battlefield with the same regularity and quietness as on the drill-ground. No emotion shows itself in them when the thunder of the guns announces the beginning of the battle, nor when the action is at its hottest; no hesitation nor unsteadi-

ness is noticeable when shells tear gaps in the columns, or when hostile cavalry threatens to ride them down. The Russian is matchless when the necessity arises for sacrificing himself and showing the glorious negative energy arising from his long course of training in patience, devotion, and subjection, which alone enable him to attain to this high degree of passive courage. His heart is free from fear of death, and with cold disdain the Russian soldier meets his fate and goes blindly into action, suppressing absolutely all his human feelings; he might have served Kant as a type of his "categoric imperative." He still possesses the old fierce determination which, shrinking from nothing, gives him a truly unconquerable power to dare and to do. In this respect the Russian soldier is second to none, and there is only one which approaches him in these qualities and in endurance—the Osmanli.

Russian fatalism lies at the bottom of this steadiness, endurance, cool bravery, and boundless contempt of danger. This it is which deadens the feelings and hardens the already hard heart. The Russian soldier never thinks of "to-morrow," for he does not know whether his fate will permit him to see another sunrise, and of the hour to come he only knows that it is one of the twenty-four units of the day. With his national indifference to, and disregard of, his own life and the lives of others, the Russian stands as if rooted to the spot when ordered to do so, for he cannot die twice, and he must die once. The teachings of his religion that death is the only sure refuge from life have probably much to do with this characteristic, and the Russian dies as calmly and as uncomplainingly as he lives. From his birth this feeling of being tired of life is innate in him, and truly his life is joyless, unattractive, and worthless. As he has neither to trouble for freedom, which he has never known, nor yet for any other of the higher goods of this world, it is not difficult for him to lay down his life amidst the smoke and blood of battle while steadily holding his position, or to let himself be cut to pieces in an attack. Alongside of this fatalism there is no room for the instinct of self-preservation, and it is easy to get the upper hand of the small atom of fancy which is left him. His cool courage and resolute bravery do not, therefore, spring from a strong, clear will, a feeling of pride, or self-confidence, but rather from warlike—or shall we say unwarlike?—passionlessness united to defiant obtuseness. This is why the Russian is so cool in action; the fear which the thought of death gives rise to and which annihilates the best qualities of the soldier, causing him to cling to life, and finally to seek refuge in flight, is unknown in the Russian Army. A Russian's courage rises easily to recklessness, but recklessness is not courage, for to the latter belong restrained strength, heart, and intelligence, all qualities which are wanting in the Russians.

The word "unwarlike" has been intentionally used above, for the great mass of the Russian people has no love of adventure or of glory, and is not possessed with the lust of conquest. Bitter Slavonic oppression does not allow the resiliency of youth to find vent, and only those nations which possess this quality can be termed warlike. In spite of all his conquests in times past and present, the Russian is still destitute of the lust of conquest in the narrow sense of the word; he is a good soldier, but not an ambitious soldier. Only the unconscientious, restless elements of the people have inherited these desires from their Asiatic ancestors, and, unfortunately, these modern Scythians have succeeded in finding and utilizing willing tools from among the vast and hitherto slumbering masses.

In trying to picture the behaviour of Russian troops in action, a consideration of his conduct on the defensive is most interesting. He still gives proof of those qualities which Archenholtz attributes to him in his description of the Battle of Zorndorf, in which he says: "These warriors fought in a

manner quite new to the Prussians. After they had retired in good order from their positions, and had exhausted all their ammunition, the men stood in their ranks like pillars. This wonderful bravery did not arise from desire of fame or from love of country, which might have caused them to hold their posts till the last moment, for they hardly defended themselves at all, but simply stolidly allowed themselves to be cut down where they stood. When whole ranks had fallen, others appeared in their place and calmly awaited a like despatch to the land of shadows. It was easier to kill them than to make them take to flight, and even a bullet through the body was often not sufficient to cause them to fall." It was this unyielding steadiness in the mass, and the energy thus passively expressed, which drew from Frederick the Great the saying that it was easier to cut down a Russian than to defeat him. Just as he was characterized by Frederick the Great, so we find him in the middle of the nineteenth century in the sanguinary and hotly contested Crimean War. Although, at the beginning of the siege, Sevastopol was almost without land fortifications, nobody in Russia dreamed for a moment that the place would be surrendered. At an inspection, General Korniloff pronounced these proud words to his troops: "We shall die, children, but shall not give up Sevastopol!" to which his men replied: "Yes, die, hurrah!" They kept their word and remained unconquered till their strength was utterly exhausted, for Korniloff's troops and many others of their comrades did not surrender Sevastopol, but merely abandoned to the enemy a heap of ruins covered with corpses. "Death is beautiful when one meets it among one's comrades," says a Russian proverb. At the moment when in the French Army the fatal cry of "Sauve qui peut" is raised, and the sense of self-preservation loosens all military bonds and despair seizes on all with truly demoniacal power, only stolid resignation sets in in the Russian Army; in the former, this cry of fear sets everything into confusion and disorder; in the latter, danger causes that rigidity which forbids the shame of flight and prevents discipline from being loosened.

While Archenholtz has given us a picture of the Russians on the defensive, Fadeyeff has left us a sketch of their conduct on the offensive in his work, "The Politics and Means of War," in which he writes: "Our offensive shock tactics would nowadays be an absurdity for any other army, but every energetic people has its own method of winning battles." This sentence, which pleads for a blind rush forwards, refers to Suvaroff's expression: "The bullet is a fool; only the bayonet is brave," and to a hand-to-hand fight in which the Russian trusts to his favourite weapon—cold steel. Let us consider more closely these shock tactics, this old and rusty weapon, in favour of which Fadeyeff has thrown down the gauntlet before modern military science and the lessons of military history. It is true that if there is hardly any other body of troops equal to the Russians on the defensive, there is also hardly another which gives equal proofs of heroism on the offensive. Under energetic leaders, once placed in the old Russian formation shoulder to shoulder and set in motion, Russian troops lose suddenly every trace of their rigid, inflexible slowness, undertake calmly the most difficult and dangerous tasks, develop in their desperate advance a boundless dash and power of endurance, move on like walls, and are neither shaken nor held back by the enemy's missiles, always getting closer in an almost unnatural manner, until at last they bring the bayonet, that extreme expression of the human will, into play. It is on such occasions that one appreciates the granite-like strength of the Russian, and that all that is manly in him comes out in its full glory, as does also that equanimity which is generated by blood which never is deeply stirred up. Next to steady endurance on the defensive, the lava-like rush on the offensive is the characteristic of the Russian soldier. He is equally suited to the defensive

and the offensive. We must here notice one circumstance, the importance of which is not to be underrated for those night actions which will probably play a great part in future wars. We refer to the so-called "hen-blindness" which is very prevalent in Russia, and which, as has been often proved, renders a large number of the soldiers absolutely useless for duty after darkness has set in, as they cannot see anything.

But higher still than the endurance of the Russian troops on the battle-field, higher than their dashing bravery in attack, do we value the ever-enduring readiness for fighting (we cannot call it keenness for fighting) which after victory or defeat is never found wanting, and which is an index to the stuff of which Russian soldiers are made. Even after the most crushing defeats, the great military organism, like the nation from which it springs, breathes again, softly certainly at first, but soon the half dead body has regained all its old strength. With ever renewed courage, Russia opposed herself to Europe led in arms against her by the great Corsican in 1812. Her armies were always ready to march and fight, and always inflexible in spite of misfortunes. In this respect the Russian people may look back with pride on their past military history, and on the proofs of unconquerable power of resistance which they gave in the Napoleonic time, on Borodino and Moscow, on Sevastopol, Plevna, and Shipka. Patience, obedience, soldierly skill, and a certain degree of plasticity, qualities which are only found in a nation which is sound at the core, have united to produce the splendid result of Russian inflexibility. We find the same quality in their political as in their military activity; in the former we see fixed plans and purposes steadily followed, and we learn that the great Slav Empire never allows itself to be turned from its object by failures.

The Russian Staff is peculiarly prolific in the matter of regulations and instructions. In spite of this wealth of written matter, however, or perhaps rather in consequence of it, the duties of the Army are not carried out according to regulation, for it is difficult even to find out the precise prescriptions for each detail, and it is still more difficult to cause them to be followed, that is, to make them enter into the flesh and blood of the Army. The new Regulations have penetrated only skin deep, and the old forms still prevail; in fact neither Officers nor men can do without them. An attempt is made to replace the wanting experience, intelligence, and education by strict drill, and as the Russian priest says, "Do not think, but believe!" so the Officer says to his men, "Do not think, but drill!" The Officers are absolutely ignorant of their important mission of educating their men and encouraging them to think and act for themselves. In Russia, School and Army are not, as in Western States, the complements of one another, and there they laugh at the idea that there can be nothing but gain by educating the people as extensively as possible. The Russian Officer, who does not understand the individual, turns instinctively to the larger units, and only studies the soldier as an atom of those units. In our opinion it is not only the *Russian* Officer who studies the nature of his men insufficiently. In Russia they have never yet succeeded in making the moral spark which puts life into everything penetrate through the dead mass of formalism, nor indeed has an attempt in this direction been made; on the contrary, all individual efforts of the sort are suppressed, and this degradation of mankind has as its result the production only of a mere killing machine.

After what has been said above, it will be granted, probably, that the Russian infantry as a fighting body is without an equal. This is, however, not the case when we come to consider other phases of a battle than mere fighting, for it must be difficult for it to begin an action according to modern procedure, to prepare an attack by fire, to make the best use of the features of the ground both individually and in units, to form those long flexible

lines of skirmishers in loose order which adapt themselves to the ground, and to take advantage of the method of advancing by rushes. Incapable as the Russian soldier is in action of perceiving the most palpable and simple things, and clumsy, helpless, undecided, and unthinking as he is, he distrusts himself and his own opinion, and all the more blindly obeys the stern order which imparts a little energy to his spirit. The natural consequence of such a state of things can only be the loss of all formation when there is no one left to give a word of command. Although nowadays there is no reason to suppose that Russian bravery will fail in front of breechloaders and magazine rifles, still it will be met by annihilation, and then the blame will have to be laid at the door of the leaders who rashly believed that reckless dash would make up for everything else. Were not the terrible attacks of the Russians on Plevna, where human blood was poured out like water, as severe indictments against the leaders as brilliant proofs of the splendid behaviour of the troops?

Before the outbreak of the last Russo-Turkish war, Field-Marshal Moltke said to the Emperor William: "The Russians will have harder work against the Turks this time than in former campaigns;" and in the course of the last ten years the principle contained in these words has only gained in truth by the armament of all European armies with murderous small-calibre rifles. Modern warfare calls for extraordinary exertions both on the part of the troops and their leaders. What will be the behaviour of a Russian Army when it finds itself at the point where the chapter of accidents has brought about a great decisive action, when all those new things come upon it as a surprise, and when the seriousness of the situation calls for the whole of its intellectual and physical power to be put forth? The putting into force of Suvaroff's maxim, "Take by storm," will then be the beginning of the end, and the latter part of the maxim, "cost what it may," will become a reality, for it will cost more than the lives of brave men; it will bring about a defeat. To revert once more to the experiences of Plevna, was it not there where Skobeleff's dashing recklessness almost brought about the tragic disaster which the Army only escaped by a hair's breadth?

Such are the characteristics of the Russian people, which form 75 per cent. of the European population of the Empire, of that people which so many fear and so few understand, and such are the characteristics of that Army which, led by ambitious and avaricious commanders, is now concentrated on the German, Austrian, and Roumanian frontiers, waiting to fulfil Russia's "holy mission" in Europe by a barbaric blow at the heart of civilization, and to put new life into it by pouring young healthy Russian blood into the poisoned, feeble, and sickly veins of the West. In ancient Asia at the same time the frontier posts are being moved forward almost hourly, and the half barbarous tribes in the East and South are being gathered under Russia's banner and made subservient to her purposes.

Still the feverish haste with which Muscovitedom is seeking to press forward from its Scythian wastes towards Central and Southern Europe, so as to draw the neighbouring countries into the whirlpool of Slavonic sovereignty, is no plant of recent growth; just as mountains appear natural defensive positions, while seas and steppes, upon which nations cannot take root, appear to induce naturally ideas of offensive operations on a large scale, so does Russian history for centuries before the rule of the Tartars, and immediately thereafter, give constant proof of the inclination of the people to extend its possessions. Everyone who has not drunk of the waters of Lethe will remember the second article of Peter the Great's will, which runs: "Russia must always wage war and keep its people warlike and ready to march." Students of history know that Russia lives by the sword, which elsewhere is

only looked upon as a weapon of destruction, and therefore the word "peace," which in non-Russian Europe is held in high honour, is in Russia of little account. While the other nations of Europe find, even in victorious war, no compensation for the loss of the blessings of peace, and prefer to develop their interior organization, the Eastern Empire is constantly setting up pretensions against its neighbours, which, in their destructive arrogance, are not to be satisfied at any price. This destructive arrogance is justified by the "Moscow Gazette," which expressed itself as follows in defence of Muravieff, the enemy of Poland, and the "man of deeds": "Russia will place herself like a shield before those men who do not shrink from the necessity of applying the law in its full force to secure the saving of the country. Just as one can never reproach a laurel-crowned victor with the blood he has shed, so one can never accuse of barbarism a statesman who has taken energetic measures." Nor must one forget the important words of a Slavonic author, which may be read in Wagner's "Caucasus," page 86, and which run: "We Slavs owe our Western neighbours a warning of the gravest importance. The West forgets too easily the North of Europe and Asia, that home of plundering and warring peoples. Do not let it imagine that these peoples have died out. They are always there like a cloud charged with electricity, and only awaiting a sign from heaven to throw themselves on Western Europe. Do not let it believe that the spirit of Attila, Djenghis Khan, Tamerlane, or Suvaroff, those terrible scourges of men in those Western regions, has finally disappeared." Such words show the West that it is not yet time to turn the sword into a ploughshare, and the barracks into almshouses.

What now would be the military chances if the zeal of the people, opposing interests, or the passions of their leaders, brought on a great war? Before entering on this question, we must preface our remarks by a few political considerations.

In the Russian Army there undoubtedly exists that feeling which is a product of the unmeasurable chaos of military, political, and religious forces at work in the great Eastern Empire and people—the desire for dominion over the world. In the face of this national aspiration, the words which Emperor Nicholas once uttered are literally true: "People deceive themselves in Europe when they imagine that in Russia the Tsar is all-powerful." After words like those from a Nicholas, what can an Alexander III say at a time when Panslavism is getting more and more the upper hand, when the destruction of the Imperial power by Nihilism is to be feared, when the old fable of the magician's pupil is being fulfilled, and when fanaticism is being stirred up by agitators and there is no power which can allay it?

Certainly Nihilism has not yet penetrated to the great masses of the people, but worse than this Charybdis is the Scylla of Panslavism. To prevent the fanatical assertion of the rights of man from being heard in the interior of the Empire, to prevent the flames from bursting out and turning Holy Russia into a sea of fire and blood, and to preserve the absolute ruler from attempts on his life, Panslavism would not shrink from carrying the torch of war into the neighbouring countries, letting loose the Tartar hordes upon them, and putting the iron yoke of their own despotism upon the peoples of Europe.

What chances of success would such a beginning of war have? Would the Russian Army be in a position to realize these far-reaching hopes? The power of an army is measured by time, space, resources, and propulsive force, time and space being formal conditions, and resources a material consideration, while propulsive force is the result of all three, and it is in it that power is really shown.

Let us first consider *time* and *space*. Formerly armies took months to

concentrate, but nowadays the operation has been so quickened, that a gain of a few days or even hours is sufficient to attract the goddess of success to the banners of the swifter Power. Shakespeare says, "Readiness is all," and in our day there is much more truth in these words than there was at the time they were penned. The Russian Army can, however, certainly not claim for itself superiority in quickness of concentration over others, because, as we know, there is little trace of harmonious working in this huge military machine, and for the reason, as pithily put by the same great writer, "there is not darkness but ignorance."

As regards *space*, Russia is in general thinly populated, and its huge extent carries with it a great weakness, which no one realized more painfully than the Emperor Nicholas during the Crimean war, when whole divisions either arrived too late on the theatre of war, or disappeared during their march thither. He it was who said, "The cankerworm of my Empire is its size." In spite of all this, that Tsar was a decided enemy to all railway extension, and failed to see that by a net of railways in all directions, and by other material improvements, his Empire would be closer knit together, and many of the difficulties caused by the distribution of his millions of subjects over such an enormous territory, thus hindering every attempt at concentration of strength, overcome. In the last ten years much has been done to remedy this state of affairs; a glance at the map will show how the whole of Southern and Western Russia, the scenes of future warlike operations, is traversed by a network of railway lines; but the North and East are still but scantily provided with such. Blume's words, "Telegraphs and railways have so diminished time and space, that the whole country has become the base of operations," have not yet become true when applied to European Russia. Besides, the railways are almost all single lines, and under ordinary circumstances only six or eight trains a day are forwarded along them. It is more than doubtful whether the training of the personnel and the state of the rolling stock and permanent way would permit of about 18 trains a day being passed over the lines. To permit, therefore, of the offensive being undertaken with rapidity, large bodies of troops have been concentrated in peace within a stone's throw of the frontier, but in spite of this measure there will still be great difficulties to be overcome, and a partial concentration of the Army will only be effected with great loss of time, and at enormous cost. The difficulties of this concentration will be materially increased by the fact that the distribution of the field, reserve, and Cossack troops corresponds less than ever with the territorial subdivision of the Empire. The infantry and artillery stationed in the West and South are on the peace footing. To bring a Russian infantry regiment up to war strength, about 2,000 men are required, and these must be brought up from the regimental recruiting district. The calling in of these men—8,000 in all for a single division—and their clothing, arming, and equipping, will take a considerable time, and it is only after all these operations have been performed that the transport by rail, frequently over a great distance, can be commenced, and only after this has been completed can they join their regiments. Let us now take another example, that of the XVth Army Corps, which has not yet been shifted westwards,[1] and which consists of two divisions at Kazan and Saratov. There is not one single railway available for the concentration of this corps, only wretched roads. Before its transport by rail westwards can begin, the division at Kazan must be brought by steamer by the Volga to Nijni Novgorod. This latter is, as the crow flies, 1,600 kilomètres from Warsaw. At the disposal of the division at Saratov are the two railway lines: Saratov-Kozlov-Yelets-Orel-Smolensk and Samara-Syzran-Penza-

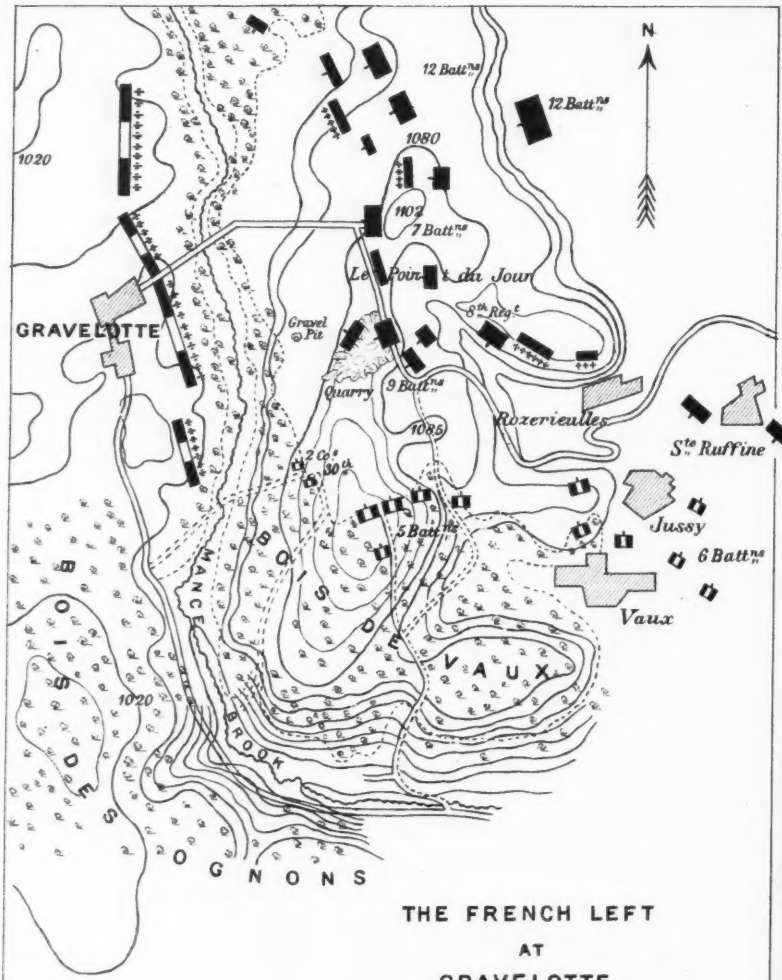
[1] It has been so shifted since this was written.—J. M. G.

Morshansk-Tula-Kaluga-Smolensk. As, however, distance corresponds to time, distance becomes a doubly important factor, first on its own account, and then as a geometric factor with time. By the latter must be measured lines of operation, bases, flanks, tactical and strategical fronts, and the difficulties which the enormous distances would cause in any change of front which might eventually be necessary. On the other hand, the enormous extent of Russia is a most important factor in defence, and it would not be easy for an enemy to seriously interfere with the process of mobilization. In future wars also, defeated Russian armies will be able to retire great distances to refit, while the pursuing enemy will find few points of support or shelter, and will be constantly kept on the *qui vive* by the numerous Russian cavalry.

As to *resources*, the power of Russia is colossal and not to be annihilated, as we have shown above.

We now come to the *propulsive force* of the material power, to the real proof of strength. An Egyptian proverb says: "He is only half a man who can neither read nor write." Measured by this standard, there are few whole men in the Russian Army, for, of the recruits placed in the ranks in 1885, 73·5 per cent.—almost three-fourths—could neither read nor write. In the last levy there were in European Russia 73·2, in Asiatic Russia 82·1, and specially in Siberia 81·2 per cent. of illiterate recruits. Reading and writing are certainly of no importance in producing physical strength and courage; but if we consider the extremely complicated nature of modern armies, in which even the meanest individual plays his part, and if we remember that modern warfare is a science, that thought and ideas are stronger than bayonets, and that the energy of moral power is of more value in an army than that of physical strength, we cannot concede to a Russian Army, with its low standard of education, any superiority over a Western European force. The Russians have never been quite blind to this fact, and, before the present striving after greatness seized hold on them and made them reject all foreign influences, they have endeavoured to learn from their neighbours, first from the Byzantines, afterwards from the Western Powers. It is not without interest to point out that, in the year 1583, Ivan the Terrible only concluded peace with the Swedes on condition that the Swedish king would hand over to him 200 soldiers trained "in the German manner." Everybody knows how much the forces of Peter I owed to the West, and how the lesson his North-Western neighbours taught him at Narva was not in vain, as he showed afterwards at Poltava, where he defeated his master in the art of war.

If Russia desires to conquer the world, and knows no other reasons for making war than her own lust of conquest and desire to make Europe and Asia serviceable and tributary to herself, and no other right than her own rude natural strength, she should also consider that whoever disregards right and takes to force subjects himself to the laws of force. If she relies on the superiority in numbers and the physical strength of her masses, and if General Dragomiroff, in speeches and in writing, rails at shooting, which he says emanates from the Germans, and calls those latter "knights of the cupola," who are afraid to fight with the only manly weapon, the bayonet, the Germans can reply that, at Zorndorf, Prussian bayonets showed themselves superior to Russian, and the men who stormed the Geisberg and the heights of Spicheren and the horsemen of Mars-la-Tour can afford to smile at his names. Lastly, the leaders on the other side of the Vistula should also consider the question whether it is so certain that, after Russia has trodden the freedom of nations under foot for centuries and ground them down in the endeavour to make Russians out of them, thus causing reef after reef to arise, some of which have nearly wrecked the great ship, these nations will readily follow her banner in war. "When Russia weeps, Poland's heart rejoices," said the Emperor Nicholas.

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## NOTES ON THE MANŒUVRES ROUND METZ, 1890.

By Brevet-Major HENDERSON, York and Lancaster Regiment, Instructor in Tactics, R.M.C.

MOST soldiers are acquainted with the general outlines of the battle of Gravelotte. They are aware that no less than four of the eight German corps that took part in the action were prematurely engaged; and that, in every case, their precipitate attacks met with severe punishment, especially those of the Guard upon the left, and of the VIIth and VIIIth Corps on the right. The enterprise of the former against St. Privat has found no apologists; but General Hamley has pointed out that the desperate attack of the latter on that flank of the French which Frossard's skill as an engineer had made so formidable, had the effect of inducing the French Commander to retain his reserve in rear of this wing, at least seven miles distant from the point where the battle was eventually lost. In addition to the VIIth and VIIIth Corps, the IInd Corps was also employed in the vain attempt to surmount the long open slopes commanded by Frossard's entrenchments; and, whilst their losses reached a total of nearly 5,500 Officers and men, those of the enemy immediately opposed did not exceed 1,300. However, as omelettes are not to be made without breaking eggs, this heavy butcher's bill was not, perhaps, an excessive price to pay for the detention of the French reserve.

At the same time, such desperate methods are not without their dangers. We have it on the authority of General Sheridan that at one time the crisis was so grave that it required the presence of King William himself and Count von Moltke to arrest the tide of fugitives streaming through Gravelotte village. Moreover, it has been alleged that it was not so much the attack on his left front as an attempt made by a small portion of the VIIth and VIIIth Corps, eight battalions and one battery, to turn his flank, that led the French Commander, Bazaine, to make a faulty disposition of his reserve. Whether this assertion be true or not, it may be observed that not a single battalion of the reserve was brought into action, that so little apprehension was there that its services would be needed on the left, that with the exception of one brigade, which was sent to support the centre of the line, not a single battalion was posted within three miles of the threatened point. Neither the attacks of the VIIth and VIIIth Corps, nor the flank movement above mentioned, were sufficient to draw the reserve into fight, or even to draw a single battalion of the force that composed it from its original position.

There are officers in Germany who believe that had the attack of the VIIth and VIIIth Corps been more skilfully conducted, the reserve and the entrenchments on the French left might have been turned and perhaps carried. On the 19th of August of this year, the day after the twentieth anniversary of Gravelotte, this probability was practically tested by the Metz Army Corps, and it was my good fortune to witness this interesting experiment. The section of the Gravelotte position which was the scene of the operations requires little verbal description to assist the map. I may state that the reverse slopes of the wooded height which envelops the French left vary from 10° to 35°, that the highest ground within the coverts is more than 400 feet above the roadway to the south and east, that the paths passable for guns are few in number; and also, that the spur 1,500 paces west of Rozerieulles, marked 1085, hides troops posted to the north of it from the borders of the wood north-west of Vaux. It will also be noticed that the former village lies in a deep ravine, which formed as it were a great dry ditch round the left flank of the French position.

Reaching the Point du Jour at 8 A.M. on the day of the manœuvre, I found the position of the French troops indicated exactly as they are on the map[1] annexed by detachments of infantry and a few guns. The position of the nineteen Prussian batteries on the opposite side of the Mance ravine was shown by parties of cavalry and yellow banderoles. In the German service, on such manœuvres as the present, the enemy is represented by small bodies of troops carrying articles which resemble, more than anything else, dummy targets painted red; a triangular canvas representing a battalion, a square canvas a company, and with this system all ranks seem perfectly familiar. On our arrival on the ground the "marked enemy" was just sending out his patrols. A few, very few, cavalry scouts were watching either flank, and two infantry privates, under a non-commissioned officer, were moving out from each battalion in the first line. No hostile infantry were visible on the opposite ridge; the dense woods which fill the Mance ravine and cover its slopes on either side were silent, and for more than an hour not a single shot was fired. We may presume that during this time the action was supposed to be confined to the artillery, and that instead of the silence of the still summer morning the air should have been filled with the roar of more than 200 guns.

Shortly after nine o'clock, faint reports were heard in the deep valley far away to the south. A German detachment of all arms was threatening the extreme French left, which was appuied on the villages of Rozerieulles and St. Ruffine. The guns on the commanding height above the former now came into action, and for a time the attack was easily held in check. Up to this point the action had been nothing but the 18th of August, 1870, re-enacted. On that day the 15th and 55th Regiments, seeking a way round the enemy's left, had failed to advance beyond the villages of Vaux and Jussy. A portion of the force occupied the edge of the road immediately north of Vaux, and, later in the day, was strongly reinforced. No attempt, however, was made to press forward along the plateau. The weakness of the brigade, especially in artillery, was insufficient to bring about a decision on this part of the battlefield.

The brigade, however, was not the only body of troops present in this quarter. From the afternoon of the 17th, three, and at a later period five, battalions had been posted, as shown in the map, 1,300 paces south of the Great Point du Jour Quarry, and 2,000 paces west of the Prussian line in front of Jussy and Vaux. The only part taken by this force, according to the Official Account, is that during the day they kept up "an unimportant fire," and that after seven o'clock they made an advance in the direction of the high road, and "ensconced in folds of the ground, maintained themselves there for some time against repeated sallies of the enemy." Small as was their effect on the issue of the actual battle, it appears that it was from the point occupied by them that a flank attack on the French left, in the opinion of the authorities at Metz, might have been most effectively made.

The sound of artillery on the height above Rozerieulles induced me to change my position to the bend of the road just south of the great quarry, which was strongly occupied, and from the commotion amongst the cavalry scouts along the border of the wood which lies opposite, I found that, while engaging the enemy along the Point du Jour plateau in front, a portion of the attacking force had evidently moved along round by the Mance valley, and was now on the point of issuing from the Bois de Vaux by the road leading from the mill. Information to this effect had already been sent to the

[1] The map is a rough copy of the official map on a reduced scale. I would draw the reader's attention to the skilful use made by the attacking force at the manœuvres of the cover afforded by the high ground south of the quarry.

French Commander, for what appeared to me like an entire brigade was moved from the Rozerieulles height (the 8th Regiment was there stationed according to the official map), and posted across the spur marked 1084, some 400 or 500 paces east of the cart track that runs from the bend of the high road to the wood. Very soon a long line of spiked helmets appeared along the lisière—the cavalry scouts rapidly retreating—and found good shelter: the French batteries on the Rozerieulles height being fully occupied with the guns in the Mance valley.

Within a few minutes, another strong body of infantry issued from the wood by a road about 1,200 paces to the west, and found cover behind the crest of the long knoll in front; whilst every now and then glimpses could be seen of another powerful detachment moving northward through the wood with the evident design of establishing itself in front of the Point du Jour Quarry, and at the same time more spiked helmets appeared near the gravel pit to the north-west. The quarry, I have said, was strongly held (the official account makes the garrison seven battalions); but it was now invested on three sides, and the defenders were obliged to occupy three faces, each line of the defence being thus exposed to direct, flanking, and reverse fire. The discomfort of this situation was much intensified when guns suddenly opened from that point of the road which is marked on the map as the position of two companies of the 30th Regiment.

The defender's line across the spur marked 1085 now attempted a counter stroke; but the German troops were well covered, a flanking fire struck the left of the advancing line from the wood, and the umpires ordered them back to their original position.

The next stage of the proceedings was the attack on the pronounced salient formed by the quarry. To cover the flank of the advance, a battalion, two companies in front and two in support, advanced from the northernmost road, wheeled to the right at the double, and took up a position along the cart track, facing east, where bushes and shrubs gave shelter.

As soon as this force had firmly established itself, a general advance was made upon the quarry; the companies moving deliberately, at first with very little firing, but when within 700 or 800 yards of the enemy advancing by rushes of companies. Before this enveloping attack the defenders of the quarry gave way; but the brigade on their left still held fast to the high road. It was manifest, however, that its position would soon be rendered untenable by the occupation of the quarry and its excellent cover by the enemy; and the latter, recognizing this, made a vigorous attack on that part of the force which held the high road from the quarry to the bend. This attack was made by a battalion, brought up from the westernmost road through the wood, wheeled to the right, and placed in the gap which existed between the quarry and the left flank of the battalion on the cart track. Unfortunately, patches of clover, prohibited ground, intervened; and the final charge was made in a confused column on a narrow front; but the supports had already been brought up and merged into the front line, moving in close order at the parade step for some distance, and then breaking up into groups and filling up the gaps in the firing line. The "Cease fire" sounded as the defenders withdrew from the high road, and a glance at the map will show that the occupation of the quarry and of the spur 1085 would have placed their left wing in the greatest jeopardy. I afterwards learned that twelve battalions and two batteries were employed in this attack, and that a company of infantry had been attached to each of the batteries in order to assist their ascent of the steep slopes and narrow roads of the Bois de Vaux. There were also several batteries in the Mance Valley.

About a week later, I was fortunate to fall in with a German brigade of nine battalions, billeted at Neider-bronn for brigade manœuvres. The second

day of these exercises was specially interesting, though here again the enemy was a marked one. The first portion of the day's work consisted of an attack on a strong position, during which six battalions had to pass through a thick wood, some 1,500 yards from the line held by the dummy targets. In fact the advance through the wood was evidently what the General wished practised. One of the battalions came out into the open in some confusion, not having halted to reform before breaking cover. It was ordered to retrace its steps; and as soon as it had repeated the manœuvre to the satisfaction of the Brigadier, "Cease fire" sounded, and the mounted Officers were called up to hear their superior's critique on the performance, and to receive instructions for a fresh exercise.

Within ten minutes of the Officers being assembled the General had said his say; and within half-an-hour, without the intervention of a single Staff Officer, the force had taken up a defensive line at right angles to its former position, formed up in three lines, with a battalion ready to make a counter-stroke on the right flank; and this notwithstanding that some of the battalions had to march more than a mile to get into their new positions. It was impossible to help remarking that readiness in adapting the troops to the ground was as conspicuous here as at Gravelotte. It is true that the ground was open, and the natural defensive features well marked; but, none the less, the quickness with which their advantages were recognized, and the exactness with which each battalion fitted into its place, showed extensive practice and great tactical skill.

Two companies from each of the battalions formed the firing line, each with a section in support; and in more than one case the third line was formed of a battalion of another regiment. The general reserve appeared to be detailed to carry out the counter-attack; and the whole exercise was probably designed as a practice in selecting the first line of a defensive position and in fire-discipline. The absence of artillery and cavalry made it otherwise useless. On this occasion the marked enemy was employed as the assailant; and at 900 metres distance the defenders opened a slow fire on the line of dummy targets advancing up the open slopes. As the attack developed, the supports were brought up—when the enemy was about 600 paces distant—but by whole sections, not by groups, and as they took their places in the foremost line, the counter-attack began to make itself felt upon the enemy's flank. The latter manœuvre put an end to the direct advance against the right of the defenders, but against the centre and left the enemy pressed steadily forward. When he arrived within about 350 yards, the second line was brought up, in one instance a Saxon battalion of the brigade being literally piled on top of a Prussian battalion; and elsewhere, two battalions of a Bavarian regiment being promiscuously shuffled in the firing line. At this short range the order was given for quick firing, the enemy was ordered to fall back, and the manœuvre came to an end. In this manœuvre—this was not the case at Metz—smokeless powder was used and the magazine rifle. The latter was not used as a repeater; but I may state, as there is no cut off and the rifle is loaded only from the magazine, that there is every temptation to the soldier to fire off his rounds as rapidly as possible. In this respect the German fire-arm is inferior to our own.

The powder, on the other hand, was decidedly effective. It is certainly not absolutely invisible, and it is quite as noisy as that which it has superseded; but it takes good eyes or strong glasses to detect its presence at more than 400 yards range under ordinary circumstances. Against a dark background, such as a thick wood, and in dull, damp weather, it was visible, after some minutes' heavy firing, to the naked eye at 1,000 yards and over.

I have no intention of speculating on the modifications in tactics which smokeless powder will impose, but I will note down two or three reflections

which occurred to me after seeing it used. In the first place, the assumption of some impulsive critics that the new invention is more advantageous to the defence than to the attack appears open to question. At the manœuvres above mentioned, the numbers forming the firing line of the defence might have been counted, man by man, by the assailants—their helmets, at least, were always distinctly visible—it was much easier to estimate the numbers and the extent of the position than if it had been shrouded in clouds of smoke. It is true that the ground, for the most part, was very open, without hedges, rushes, gorse, or crops; the natural undulations or hollow portions of road were the only means of cover and concealment. On the left, however, was a thick wood with a fringe of undergrowth; and although a force which occupied it took an active part in the proceedings, it was absolutely impossible to calculate their numbers or to discover their exact position, so effectual was the concealment afforded by the scrub; and the feeling of helpless ignorance thus induced gave me the impression that the moral effect of a flank attack made under the same circumstances would be far greater than under present conditions. A small force, armed with magazine rifles, well concealed, keeping up the most rapid fire possible, and affording no mark to the enemy, might bring about extraordinary results.

These are but suggestions; but one thing is very certain, that all brass ornaments, and everything that tends to make men conspicuous, are more out of place than ever on the field of action; and, if the defenders would profit by the absence of smoke, the greatest precautions will have to be taken in order to conceal the existence of entrenchments.

It is impossible for any spectator of German field exercises to help remarking the incessant attention given by Officers of every rank to fire-discipline and range-finding. At every halt, Captains and subalterns immediately begin discussing with their commands the ranges of different objects; individual men are asked their opinions, the distances are checked by the map, and the soldiers are catechized as to the exact position of an enemy's anatomy they would take for their target at this range. This selection of the point to aim at is reduced to a system, the bull's eyes, so to speak, being indicated by the buttons on the tunic. For instance, when Musketeer So and So is asked where he would aim at 300 metres, he answers immediately, "The fifth button." Again, the greatest care is taken that every man is placed in the most favourable position for using his rifle, and even Officers commanding battalions may be seen instructing the young soldiers in this very necessary art. Another practice was observed at Metz: every man of a group repeating in a loud voice the range given by the non-commissioned officer in charge. I have already mentioned that, during the attack on the quarries at Le Point du Jour, the supports were brought up in groups to reinforce the firing line; but when companies of the second line were brought up to fill gaps, or to stiffen the first line, previous to the assault, they advanced in close order at the parade-step.

Like everything else in connection with the German Army, the manner in which instructions delivered by Officers to their commands before going into action is systematic and methodical. I heard this done several times; and it seemed as if the very intonation of the voice was modulated in accordance with regulation. Very slowly, clearly, and precisely, without the slightest hesitation, and so that a child could understand, the battalion Commander, as soon as he has received instructions as to the tactical objective from the Brigadier, informs the Captains of the companies which are to form the firing line of the object he has in view, and how he wishes it carried out. The Captains then explain to the subalterns in command of the leading sections what they intend to do, and these in turn explain to their non-commissioned officers and men exactly what is expected from them. All this is

done in the hearing of the whole battalion ; and the readiness with which the Officers made up their minds, and the care with which they imparted their instructions, indicates that this very essential part of their duties has become a habit. It may be remembered that General Skobeleff was accustomed to inform every rank, even the privates, of what he intended to do, the way in which he wished an attack carried out, or a position held.

Lastly, their experience of war has taught the Germans that to assault or to defend a position it will often be imperative to pile battalion upon battalion. This operation is often practised ; Officers and men appear perfectly familiar with the intermixture of units it produces, and the inevitable confusion is reduced to the lowest possible dimensions. I have mentioned already that, at the exercise I have spoken of, a Saxon battalion supported, or acted as second line to, a Prussian battalion. When the attack arrived within about 350 yards, the former was brought by companies into the firing line. The two Captains of the companies thus shuffled together met for a moment, and then the senior called out, so as to be heard by all, that his command extended from a tree to a bush, or from a corner of the road to the next bend ; and the men appeared to work just as well under strange Officers as under their own. "Casualties" were not practised ; and, so far as I could learn, they are generally confined to the company training, often taking the form of the disappearance of all the Officers in turn, thus leaving the command to the non-commissioned officers, and sometimes to the oldest soldiers. In this way is provided a constant supply of leaders, at least to the groups of six or eight files into which the "zug" is divided.

# NOTICES OF BOOKS.

*Analytical Index to Major Clarke's Authorized Translation of "The Franco-German War, 1870-71."* Compiled by Colonel LONSDALE HALE, Ret. R.E. London: printed for Her Majesty's Stationery Office. 1890. Price 1*s.* 6*d.*

This is not a word index. It contains references to all the principal events, and, besides, indexes the various groups of operations chronologically, so that each may be followed through the various sections of the work in which the account is contained. A general diary of the War, showing its principal contemporaneous events, is included. Where practicable, the date is attached to the references.

*The Influence of Sea Power upon History*, 1660–1783. By Captain A. T. MAHAN, United States Navy. London: Sampson Low. Pp. 557. Size 9″ × 6¼″ × 1¼″. Weight under 2 lbs. 14 oz. Price 18*s.*

The definite object proposed in this work is an examination of the general history of Europe and America, with particular reference to the effect of sea power upon the course of that history. Historians generally have been unfamiliar with the conditions of the sea, having as to it neither special interest nor specia knowledge, and the profound determining influence of maritime strength upon great issues has consequently been overlooked. This is even more true of particular occasions than of the general tendency of sea power. It is easy to say, in a general way, that the use and control of the sea is, and has been, a great factor in the history of the world; it is more troublesome to seek out, and show its exact bearing at a particular juncture. Yet, unless this be done, the acknowledgment of general importance remains vague and unsubstantial, not resting, as it should, upon a collection of special instances in which the precise effect has been made clear by an analysis of the conditions at the given moment. This work is published at a very opportune time.

*The Waterloo Roll Call.* By CHARLES DALTON, F.R.G.S. London: Clowes, 1890. Pp. 256. Size 7″ × 5″ × ¾″. Weight under 12 oz. Price 3*s.* 6*d.*

This is an annotated Waterloo Army List, and is the first that has appeared, and is very interesting.

*A Revised Account of the Experiments made with the Bashforth Chronograph to find the Resistance of the Air to the Motion of Projectiles, with the Application of the Results to the Calculation of Trajectories according to J. Bernoulli's Method.* By FRANCIS BASHFORTH, B.D. Cambridge: University Press, 1890. Pp. 317. Size 9″ × 6″ × 1¼″. Weight under 1 lb. 10 oz. Price 12*s.*

*Camp and Studio.* By IRVING MONTAGU. London: Allen, 1890. Pp. 395. Size 9″ × 6¼″ × 1½″. Weight under 2 lbs. 8 oz. Price 10*s.* 6*d.*

Mr. Montagu was war artist to the "Illustrated London News," and has had considerable experience of war, but this work is merely a record of interesting personal experiences, social as well as others.

*The Autobiography of a Seaman.* By THOMAS, Tenth Earl of DUNDONALD, with a sequel. Edited by his grandson, DOUGLAS, Twelfth Earl of DUNDONALD. London: Richard Bentley, 1890. Pp. 575. Size 7¾″ × 5¼″ × 1¾″. Weight under 2 ibs. Price 6*s.*

A republication, with additions, of the well-known work.

*Regulations for the Musketry Instruction of the Militia.* By Lieut.-Colonel the Hon. W. H. ALLSOPP, 3rd Batt. Worcestershire Regiment. London: Clowes, 1890. Pamp. Pp. 85. Price 1*s.* 6*d.*

From the "Regulations for Musketry Instruction," the "Regulations for the Militia," and the "Army Orders," Colonel Allsopp has in a handy form put together everything connected with the Musketry Instruction of that Branch of the Service.

*Russia's Railway Advance in Central Asia.* By GEORGE DOBSON. London: Allen, 1890. Pp. 439. Size 7½″ × 5½″ × 1¾″. Weight under 1¾ lbs. Price 7*s.* 6*d.*

This volume is the outcome of a journey from St. Petersburg to Samarcand in the spring of 1888 on the occasion of the opening of railway communication with the ancient city of Tamerlane, and of a series of letters published in the "Times" in the autumn of the same year, giving the first English description of the Central Asian Railway. Not more than eight of the fifteen chapters appeared in the "Times," and these have been so completely re-written, altered, and amplified, that they contain a large amount of fresh information. The remaining seven chapters are entirely new, and bring the account of the Transcaspian province down to the present time.

*Lord Clive.* By Colonel Sir CHARLES WILSON. London: Macmillan, 1890. Pp. 221. Size 7¾″ × 5¼″ × ¾″. Weight under 14 oz. Price 2*s.* 6*d.*

An excellently written account, a valuable addition to the "Men of Action" series.

*The Sailor's Ready Reference Book.* By Captain F. C. D. BEDFORD, R.N., C.B. Portsmouth: Griffin, 1890. Pp. 131. Size 6″ × 5″ × ½″. Weight under 8 oz. Price 1*s.* 6*d.*

A small book compiled for the purpose of placing within the reach of seamen, whether serving in the Royal Navy, the Mercantile Marine, or as yachtsmen, much of the information which has hitherto been confined to bulky and expensive works.

*The First British Rifle Corps.* By Captain WILLOUGHBY VERNER, Rifle Brigade. London: Allen, 1890. Pp. 149. Size 7½″ × 5″ × ¾″. Weight under 12 oz. Price 5*s.*

A very interesting account of the origin of the Rifle Brigade.

*Army and Navy Calendar for the Financial Year* 1890–91, *corrected to April* 22, 1890. By JOHN HAZARD. 10th Edition. London: Allen & Co., 1890. Pp. 295. Size 8½″ × 5½″ × 1″. Weight under 1 lb. 6 oz. Price 2*s.* 6*d.*

The reappearance of this valuable "Military Whitaker" is always welcome.

*The Naval Annual.* Edited by J. A. BRASSEY. Portsmouth: Griffin, 1890. Pp. 538. Size 10″ × 6½″ × 1¾″. Weight under 3¼ lbs. Price 10*s.* 6*d.*

The production of this most valuable annual has been shared by Lord Brassey, Mr. F. K. Barnes, and Captain Orde Browne, R.A.

*A Handbook of Descriptive and Practical Astronomy.* By G. F. CHAMBERS, F.R.A.S. Oxford: Clarendon Press. 4th edition. 1889–90. Three vols. Pp. 1618. Size 9″ × 6″ × 5¼″. Weight under 8 lbs. 6 oz. Price 2*l.* 16*s.*

The Delegates of the Clarendon Press have most kindly favoured us with a copy of this most valuable work. The contents are in three volumes, corresponding to the divisions of the subject:—

Vol. 1. The Sun, Planets, and Comets.
Vol. 2. Instruments and Practical Astronomy.
Vol. 3. The Starry Heavens.

We fully agree with the author in recognizing the debt of gratitude due to the Delegates for undertaking the publication of the new edition in its so greatly enlarged form, and placing in the hands of the public a work which brings our knowledge of Astronomy up to date. The illustration and topography of the work are most excellent.

Messrs. Gale and Polden have forwarded to us Nagri and Uson editions by Major H. D. HUTCHINSON, 1st Batt., 3rd Ghoorkas, of the undernamed works:—

*Physical Training without Arms,*

*Physical Drill with Arms,*

Each 9*d*.

*Military Training.* 2*s*. 6*d*. All post free to any part of the world.

*Battalion Drill made Easy,*

*Brigade Drill made Easy,*

By W. GORDON. Price each 2*s*.

*The N.C. Officers' Guide to Promotion. Lance Corporal to Corporal, and Corporal to Sergeant.* By W. GORDON. Price each 2*s*. 6*d*.

*The Elements of Modern Tactics.* By Lieut.-Col. WILKINSON SHAW. 7th edition. London: Kegan Paul, 1890. Pp. 392. Size 6¾″ × 5″ × 1½″. Weight under 1½ lbs. Price 9*s*.

Colonel Shaw has in this edition brought the work well up to date. It has been most carefully revised, and a great deal is re-written. It is almost a new book.

Mr. Webb, of York Town, Camberley, publishes *The Work of Cavalry in War, a Talk to Cavalry N.C.O.'s.* By Colonel LONSDALE HALE. Price 6*d*., or 5*s*. per dozen.

Messrs. Spon, London, publish a pamphlet on *Smokeless Powder and its Influence on Gun Construction.* By Mr. J. A. LONGRIDGE, the well-known writer on Artillery Ballistics. The price is 3*s*.

*The Garrison Gunner (Regular, Militia, and Volunteer), his Equipment and Drills other than Artillery Exercises.* By Captain H. C. G. D. SIMPSON, R.A. London: Allen, 1890. Price 2*s*.

The object of this little pocket work is to give the garrison gunner information which concerns him as a soldier, and which is not to be found in the "Manual of Garrison Artillery Exercises."

*Gleanings from Japan.* By W. G. DICKSON. London: Blackwood, 1889. Pp. 400. Size 9″ × 6″ × 1½″. Weight under 2 lbs. 2 oz. Price 16*s*.

An interesting account of a re-visit to Japan in 1883–84, by one who knew it more than twenty years before, and therefore can realize the gigantic changes of every kind which have taken place in that country.

Mr. J. K. LAUGHTON has told to the Seamen and Marines of H.M.S. "Trafalgar," at the request of Rear-Admiral Lord Walter J. Kerr, *The Story of Trafalgar.* It is now published by Messrs. Griffin, of Portsmouth. Price 1*s*.

*Weather Forecasting for the British Islands by Means of a Barometer, the Direction and Force of Wind and Cirrus Clouds.* By Captain H. TOYNBEE. London: Stanford, 1890. Pp. 36. Price 2*s*.

A valuable lecture by the late Marine Superintendent, Meteorological Office.

Major ELLIOT, 3rd Bengal Cavalry, has published at Allahabad a pamphlet in two parts, *Notes on Cavalry Literature, Treating more especially of its Armament.* It contains a series of references to articles and works dealing with the subject, with some remarks by the compiler.

Messrs. Hazell, Watson, and Viney, of Creed Lane, Ludgate Hill, have published their fifth issue of *Hazell's Annual*, edited by Mr. E. D. PRICE, and revised to Nov. 25, 1889. It is a Naval Whitaker, and contains a great amount of useful information. Price 3*s.* 6*d.*

*The Presidential Armies of India.* By the late Colonel S. RIVETT-CARNAC. London: Allen, 1890. Pp. 442. Size 9″ × 6″ × 1¼″. Weight under 2½ lbs. Price 10*s.* 6*d.*

With a continuation and general remarks on India by the author of "Our Burmese Wars, and Relations with Burma."

The first six chapters are from the pen of Colonel Carnac, the last six by the anonymous author, W.F.B.L., of the continuation, which is mainly historical.

*Advanced Guard and Outpost Duties for Riflemen.* By Colonel L. V. SWAINE and Captain WILLOUGHBY VERNER, Rifle Brigade. London: Allen. Pp. 50. Weight under 6 oz. Price 2*s.*

There is "nothing like leather," and therefore we confess that we believe this small pamphlet will be read and studied by many "green jackets" simply on account of the authorship, and the somewhat exclusive character of the circle for which it is written. So long as it is read, never mind why. At the same time, we do not quite see why an Officer who really knows from experience how the best military training in Europe is carried on, or why an accomplished surveyor, should not come to the aid of the Service generally. It is to be hoped that the next edition will be a full and exhaustive work on the subject and intended for all soldiers. The task could not be in better hands.

*The Story of Waterloo. A Popular Account of the Campaign of* 1815. By Major H. D. HUTCHINSON, B.S.C. Chatham: Gale and Polden. Pp. 55. Price 2*s.*, post free.

*Particulars of the War Ships of the World.* Eighth Revised Issue. Size 9½ × 11½ × ½. Weight, 1¾ lb. Price 5*s.* 1890.

This valuable work is issued by the Committee of Lloyd's Register, and is extracted from Lloyd's Register Book. The office of issue is 2, White Lion Court, Cornhill, London.

Besides the list of war ships there are:—1. Statistics of Merchant Shipping. 2. A Table showing the value and extent of the Commerce and Merchant Shipping of the principal countries in relation to their respective War Navies. 3. A list of Fast Merchant Steamers. 4. A List of Dry and Wet Docks, &c., in all parts of the world.

*Sir Charles Napier.* By Colonel Sir W. F. BUTLER. London: Macmillan, 1890. Pp. 216. Size 7¾″ × 5¼″ × ¾″. Weight under 12 oz. Price 2*s.* 6*d.*

A valuable addition to the "English Men of Action Series." Written in that easy and pleasant style so well known to readers of Sir W. Butler's works.

*Old Sea Wings, Ways, and Words, in the days of Oak and Hemp.* By ROBERT C. LESLIE. London: Chapman and Hall, 1890. Pp. 328. Size 6″ × 9″ × 1¼″. Weight under 2 lbs. Price 14*s.*

To many of even the rising generation some of the subjects of the 135 well drawn illustrations in this book will be ere long, like flint implements, curious things, the real use of which can be conjectured only. This is a most interesting record of a state of things fast passing away.

*Memoires of the Military Career of John Shipp.* Written by himself. London: Unwin, 1890. Pp. 386. Size 8¼″ × 5¼″ × 1′. Weight under 2 lbs. Price 5*s.*

Mr. Manners Chichester has reproduced in the "Adventure Series" a work originally published in 1829. The hero twice enlisted and twice rose from the ranks to a commission: he saw much service; and the autobiography is well worth reading by old and young.

*Suvóroff.* By Lieut.-Col. Spalding. London: Chapman and Hall, 1890. Pp. 243. Size 8″ × 5½″ × 1″. Weight under 1 lb. 6 oz. Price 6*s.*

This is an interesting account of the life and deeds of a military commander, whom many accept as having been a great commander, without knowing exactly wherein his greatness lay. Suvóroff's career is here clearly put forward. But could not the author provide a few sketch maps for the next edition? The study of military history without maps close at hand is somewhat troublesome.

*Notes and Suggestions on Military Uniforms, with Illustrations in Outline.* By Lieut.-Col. E. Browne (late Major 2nd Lancashire Fusiliers). Cheltenham: Edwards. Large Pamphlet. Weight under 6 oz. Price 1*s.* 2*d.*

*Across the Border, or Pathán and Biloch.* By E. E. Oliver; illustrated by J. L. Kipling. London: Chapman and Hall, 1890. Pp. 344. Size 9″ × 6¼″ × 1½′. Weight under 2¼ lbs. Price 14*s.*

The author has in this work met a want keenly felt by those who have no personal knowledge of the North Western Frontier of India, and yet follow with interest the events which take place from time to time in that portion of the Empire. We hear, perhaps, of some expedition against an unruly tribe, or of larger operations being influenced by the attitude taken by some people whose name is unknown to us, and of whose existence we were not even aware. In future we have merely to turn to "Across the Border," and it will serve us as a handbook through this wild country, and from it we can learn all about the various groups of inhabitants and their special characteristics.

## Extract from the Bye-Laws.

*Section II.—Composition.*

1. Princes of the Blood Royal; Lords Lieutenant of Counties; Governors of Colonies and Dependencies; Officers of the Army, Navy, Marines, Her Majesty's East Indian Military and Naval Forces, Militia, Yeomanry, Royal Naval Reserve, and Volunteer Corps shall be entitled to become Members, *without ballot*, on payment of the Entrance Fee and Annual Subscription.

N.B. Any Officer coming within the above definition, who may wish to become a Member of the Institution, can do so by copying one of the subjoined Forms, and inclosing it to the Secretary:—

### Form for Becoming an Annual Subscriber.

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It is my desire to become a Member of the Royal United Service Institution; and I hereby request and authorise my Agents [or Bankers], Messrs. _____, to pay my Entrance Fee (£1) and Annual Subscription (£1) now, and as it becomes due on the 1st of January in each year, to the Secretary of the Institution.

_____ Signature.

_____ Qualification for Membership.

### Form for Becoming a Life Subscriber.

It is my desire to become a Life Member of the Royal United Service Institution; and I hereby authorise my Agents [or Bankers], Messrs. _____ to pay my Entrance Fee (£1) and Life Subscription (£9) to the Secretary of the Institution.

_____ Signature.

_____ Qualification for Membership.

2. Ex-Governors of Colonies and Dependencies, Retired Officers, Deputy Lieutenants of Counties, Civil Functionaries who are or have been attached to the Naval and Military Departments, the Master, Deputy Master, and Elder Brethren of the Trinity House, and Army and Navy Agents, shall be *eligible* to become Members by *Ballot*.

3. Gentlemen above the age of *fifteen*, whose names are on the list of the Commander-in-Chief for Commissions in the Army, or who are probationary for offices connected with the Naval and Military Professions, shall be *admissible*, by *Ballot*, to become Provisional Members from year to year, on payment of the Annual Subscription; and after they obtain their appointments, they may become ordinary Members on payment of the Entrance Fee.

N.B. Members admissible by Ballot must be proposed and seconded by two Members of the Institution, and their names will be submitted to the Council for election. Ballot papers may be obtained at the Institution.

## Form of Bequest.

*I give and bequeath unto* The Royal United Service Institution, *situated in Whitehall Yard, London, the sum of* _____ *to be applied in and towards carrying on the designs of the said Institution, such Legacy to be paid out of such part of any personal Estate not specifically bequeathed as the law permits to be appropriated by Will to Charitable Purposes.*

No. 154 CONTAINS :—



OCCASIONAL PAPERS:



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The Council of the Royal United Service Institution are desirous of obtaining the assistance of Officers of the Naval and Military Services in carrying out the Courses of Lectures at the Institution.

Officers who will favour the Institution with a Lecture, or a Course of Lectures, are requested to communicate with the Secretary.

The Lectures, and the Discussions which follow them (or an Abstract of them), and Descriptions of Inventions, are published in the Journal of the Institution, subject to the discretion of the Council, and illustrated, when necessary, by Diagrams.

By order of the Council,

B. BURGESS, Captain,
*Secretary.*